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A STUDY OF QUALITY CIRCLE DEVELOPMENT

by

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ABSTRACT

Quality circles are a form of group activity designed to impact on attitudes to work and to improve company performance. This study notes the introduction and rise in importance of this phenomenon in UK industry and sets out to examine the concept in operation.

The quality circle is defined and explored and its aims and objectives are examined. The literature on quality circles is reviewed and is found to comprise mainly anecdotal articles written for management journals, although the amount of rigorous research is growing. Its place in wider management theory is then considered, focussing on a number of key areas which the quality circle can be said to span.

The second part of the thesis describes the case study of quality circles in action at an electronics firm, which was the backbone of the three year research programme. A number of hypotheses were developed and they are discussed in turn. A research methodology was subsequently devised to throw light on the most significant of these hypotheses, using three main techniques - attitude survey, interview and group process observation. The resultant data is described and presented in tables to be found in the appendices.

Conclusions are drawn about the quality circle programme under scrutiny. It was not thought prudent to generalise too far, but a number of less specific conclusions are expressed, together with suggestions for further work in the field which would generate useful results.

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CHAPTER 1

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CHAPTER 1

STRATEGY FOR RESEARCH

1.1 Introduction

The purpose of this study was to examine the development of the quality circle in a UK manufacturing organization. It was to be discovered how the Japanese concept of quality circles could be fitted to a Western organizational design, the extent and nature of their impact, as well as looking at their effectiveness at achieving their aims. This was quite a wide remit, but due to the novelty of the quality circle in the UK at the time the study was begun (October 1981) and the paucity of research in the field, a far-reaching brief was thought appropriate. It was hoped that the broad aims of this study would generate a number of potentially fruitful areas of research for others to take up.

The study was focussed on an electronics component manufacturer who also provided financial support for the project. The company had introduced quality circles during the late 1970s, so the programme was hoped to be well enough established to represent good research material. The study was centred on six of their factories at three different manufacturing locations (see Section 1.3 of this chapter).

Basically, three research techniques were developed to test the hypotheses drawn up over the first year of the three-year research programme. These have produced some interesting results. It has thus been possible to reach a number of conclusions about

quality circles in one particular case; it is hoped that these have some general applicability to at least one sector of UK industry.

1.2 Overall Strategy for Research

It is proposed in this section to present an overview of the strategy adopted for the research programme. Before doing this, however, it is useful to demonstrate why quality circles were isolated as an area for examination in the first place.

There has been much interest in recent years in Japanese industrial organization and particularly in their managerial philosophy. Western industry has been mesmerized by Japan's rapid post-war growth and its apparent world dominance in many market sectors from a situation of almost total decimation after defeat in the Second World War in 1945. Japan now has the fastest rising productivity in the industrialized world (OECD, 1984).

It is not surprising, therefore, that many less successful nations such as the UK, or those who feel their present comfortable position at the "top of the heap" is threatened, such as the United States, should wish to extricate the reasons for Japan's phenomenal success so they may imitate it and regain lost ground.

It is in this spirit that quality circles have appeared in the West. It is interesting, however, that they have become isolated from their context in their journey from the East, at least as far as UK practice is concerned. Quality circles began life as part of the Japanese philosophy of Total Quality Control. This integrates well-practised techniques of statistical quality assurance with methods designed to motivate the individual worker

to aim at the highest standards of quality performance; 'Quality control circles', as they are known in Japan, is but one of these methods.

They have been adopted in the UK, however, by very many firms but, as Chapter 2 demonstrates, with quite a different emphasis. It is intriguing that this one aspect, completely removed from its context, has been introduced in very many large organizations. It was hoped that this study may throw light on the reasons for the attractiveness of quality circles to managers and whether the concept achieves the desired results.

The quality circle can also be seen in the light of the recent heightened interest in worker participation in industry. Ever since the Human Relations School of the 1930s various organizational theorists and practitioners have focussed on the social aspects of organization, particularly on the individual, his behaviour and his role in the organization. If quality circles are part of this overall philosophy (discussed in Chapters 2 and 3) then it is again interesting to see if they achieve what they set out to.

With this in mind, it is possible to develop overall aims and objectives for a study of quality circles. Appendix 1 contains the specific aims which were isolated at the outset. These, in broad terms, were in three parts. One was to examine the past experience of quality circles in the study and to draw out what had been learned from it, the second to identify the determinants of quality circle performance and, finally, to project the future from the information gathered. These formed the overall approach, certainly at the commencement of research.

The aims of the programme provided a base for collecting information about quality circle development in the company studied. This information in turn formed the starting point for the development of the hypotheses discussed in Chapter 4. At this stage it had been decided to abandon the third proposed area of study, as forecasting the future required rather more certainty and conviction than arriving at conclusions about the past. Due to the intrinsic narrowness of the research programme, centred as it was to be on only one company, it was thought unwise to make forward projections without very much more information or comparisons with other environments.

The hypotheses in part dictated the selection of research techniques which could be applied, although other factors also played a part. Time constraints were the most dominant of these. With only one researcher and six different plants to study with a fairly wide geographical spread, the amount of exposure to the quality circles at any one time was necessarily limited. Quality circles are also emphatically a multi-discipline phenomenon, so a great deal of background work was required, as Chapters 2 and 3 of this thesis testify.

The research techniques were refined and put on trial, and when perfected were applied to the manufacturing units selected for the study. The results were then analysed in the light of the circumstances prevailing in each unit at the time and conclusions drawn.

This completes the overall structure of the research programme. The following chapters, however, discuss the study in greater depth. Chapter 2 introduces the concept of the quality circle in more detail and reviews the available literature.

Chapter 3 then explores some selected aspects of organizational theory which underpin the quality circle phenomenon. Having thoroughly examined the background to quality circles, Chapter 4 goes on to describe the hypotheses generated as a result and to show how they were clustered. The research methodology is explained in Chapter 5 and the results are summarised in Chapter 6. Chapter 7 brings the thesis to a close with the conclusions arising from the research programme together with suggestions for further work.

Before embarking on these, however, it is proposed to present more details about the company studied, and, in particular, about the six factories which made up the research data.

1.3 Background to the Company

This study is based on the quality circle programme in operation at STC Components Limited, a manufacturer of electronics components and instruments for a wide range of applications. It is part of the group STC plc, a telecommunications company which is one of the main producers in the UK.

As one of the eight main management companies which comprise STC plc, STC Components accounts for about 20% of total business. (The annual turnover of STC plc was £920.6 million in 1983.)

STC Components' products are used in a wide variety of applications in telecommunications, defence electronics and avionics as well as in the computer and automotive industries. In addition, to the manufacturing operations, STC Components is also a major distributor of electronics components.

The total work-force in 1983 was 6,500 although new acquisitions have pushed this figure higher since then. Production locations are spread around the UK, but the main sites are at Harlow, Paignton and Great Yarmouth with several factories on these sites. Manufacturing methods are diverse, utilizing many different "generations" of technology, from machine pressing to laser technology.

Recent performance 1981-84

Contact with the Company began in September 1981 when STC Components began to feel the impact of the Recession. Prices were falling as technologies developed, and growth had slowed as competition in world markets remained as keen as ever. Less profitable units in the Company experienced redundancies at shop-floor level amounting to almost 50% in some areas.

At the same time, a programme of "delayering" had begun, designed to shorten the management hierarchy. The traditional foreman was being replaced by a "team leader" who carried out production work primarily, but who undertook supervisory duties where necessary.

As new technology made demands on the production organization, work areas were changed, with clean areas requiring sophisticated air filtering and anti-static provisions replacing traditional assembly areas. A policy of more open management led to the removal of individual offices and workshops to be replaced by open plan layouts which affected all employees.

Much of the restructuring process was completed towards the end of the research programme. Recruitment had been reinstigated and overtime and shift working had been restored. New product areas had led to expansion, with new units being created at the major sites.

Thus it is clear that during the period covered by this thesis, STC Components underwent considerable change. In fact, a series of changes took place, each having marked impact on the organization and on morale. Chapter 6 will reveal the noticeable impression this climate of change had on the quality circle programme.

Management Style

Another change which was effected during the research programme was a conscious move towards a new style of management. Until 1982, STC Components was under the direct control of ITT (Europe), major shareholders at the time before the much publicized "sell-off". The management style of ITT is notorious (see Pascale and Athos, 1982) for its hard-line, results oriented and adversarial style. This was certainly reflected at STC towards the beginning of the research programme. Central to the management control process was the "Review" where individual department heads were required to present and defend their performance at frequent intervals. Such meetings were often gruelling for the participants and had the tendency to set departments against each other in the battle to put in a good performance. Thus manufacturing and engineering were often in conflict, and there was felt to be a trade-off as a result between quantity of output and its quality.

The release from ITT control established STC as an independent company with the ability to dictate its own style. 1983 saw moves to develop a more open approach. Policy documents promising an open and communicative approach have been released to the staff. The process of delayering has meant the foreman, a traditional intermediary between management and shop-floor, has been removed. This has meant more frequent communication between shop-floor and management on a day-to-day basis as the production manager spends more time looking after operational problems directly.

Other moves began to integrate the production and engineering functions with the hope of achieving both quantity and quality of output as simultaneous, rather than alternative, objectives.

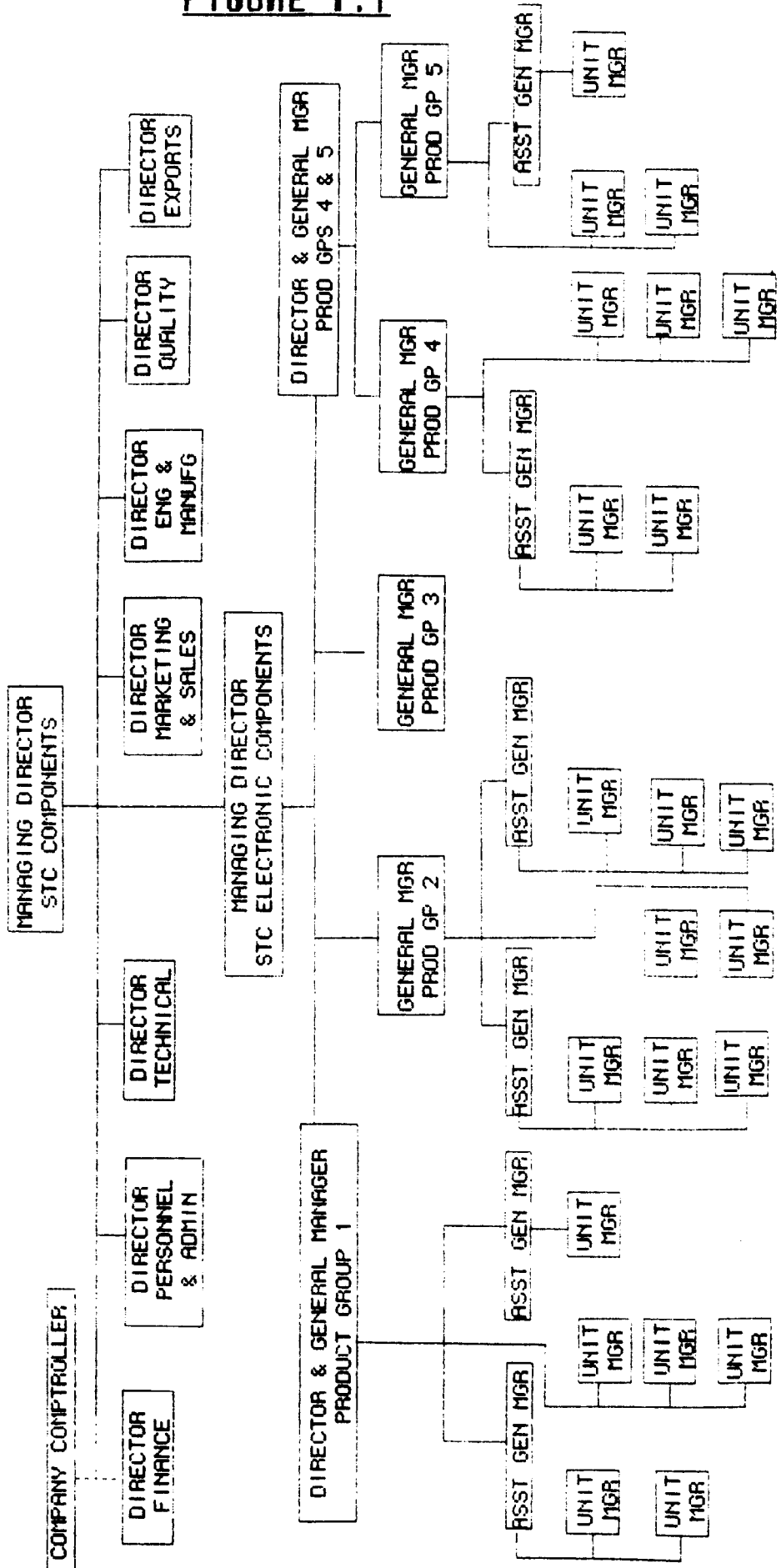
It can be seen, therefore, that the Company underwent a good deal of change over the three years making up the research programme. It is not easy to go into any more detail about the company as a whole and still retain direct relevance to the quality circle programme since the manufacturing units are so diverse in many ways. It is intended in the next section to provide a short explanation of the conditions prevailing in each unit of the study. For information, however, Figure 1.1 shows the organization of the Company as at July 1984.

1.4 Background to the Units

At the commencement of the study there were 19 manufacturing units in the Company, and 22 by the end. It was obviously impracticable to visit each of these, so it was decided to

STC COMPONENTS PLC ORGANISATION APRIL 1984

FIGURE 1.1



restrict the number in the study to a more manageable size. It was arranged with the Company that access would be granted to six units in all, based at the three main locations.

Since the units were very different and worked almost independently, it was decided that geographical location may be as important a factor as any in determining quality circle performance. At shop-floor level, many were local people, and each location had its own characteristics. Harlow is a new town built to cater for overspill from the East End of London and provide homes after the Second World War. Some who came to Harlow were from an original STC factory at Woolwich, and the Company is still a major employer in the town.

Great Yarmouth is a seaside town traditionally an important fishing port, but, since the demise of the herring industry (formerly the major catch) the discovery of North Sea gas has brought to the area a new source of employment.

Paignton is primarily a holiday resort with little industry in the area. STC Components is the only major industrial employer and one of the few providing year-round employment. It is well-placed to take in technically skilled Navy personnel discharged from nearby Devonport.

In all these cases, STC is a major employer in the town and many members of the same family may work in their factories. Each site is therefore a fairly close-knit community. It was felt that to have two contrasting factories on each site would show the differences between the two while holding cultural factors constant. At each location, the plan was to visit a relatively

stable unit and one which had experienced drastic change or was likely to do so, so that any differences would clearly show. The units on each site were roughly the same size (see Appendix 2).

It is now intended to discuss each in turn.

Harlow

1. Unit 13

This unit manufactured electro-mechanical parts for use in the telecommunications industry. Its main customer was British Telecom, at that time still in public ownership and tied to UK suppliers. World-wide competition in the product market was fierce, however, and prices were falling rapidly. Solid state microtechnology was threatening to wipe out one particular product and increasing competition was cutting profit margins and causing shrinkage in other areas. The anticipated privatisation of British Telecom, which would free it to buy from overseas, was likely to severely damage Unit 13's future profitability.

Consequently, there were several moves afoot to restructure the unit to meet new market demands. One product was being phased out, and staff working on it were being made redundant or offered the opportunity to work in other more buoyant units. Work areas were therefore suffering considerable cuts in manning levels. Investment was being switched to other products and these were being refined to make them more attractive to potential customers. At the same time, efforts were being made to cut overheads, mainly by reducing labour in non-production areas. A notable feature of this was the decision to remove specialist end-of-line inspectors (these products were hand assembled) and to switch responsibility for quality control to the individual operator.

Management/shop-floor relations were not harmonious. Management's credibility was low, based on their tendency towards expediency and decisions which were inconsistent over time. There was a widespread view amongst management that necessary changes had not been sensitively handled, thereby causing resentment from subordinates. The shop-floor was consequently resistant to any new change and morale was very low as redundancies continued.

Technology was different according to product. The endangered product line was automated, but needed 24-hour machine minders to maintain it. This work area operated a "continental" 4-day shift system of 12 hours per shift, with permanent "shift teams".

The other major work area involved in the quality circle programme was based on hand assembly and adjustment. The work area was entirely female, except for the supervisors, and was divided into day-time and evening shift workers. Workers are paid on different bases - standard time, production bonuses, and piece rates.

The quality circle programme, previously as high as five circles in 1980 had dropped to one by 1982 which met only monthly. The consensus seemed to be that current unit performance lay behind the collapse. By 1983, the final circle had disappeared and there was little likelihood of a relaunch in the foreseeable future. Many management changes had been made, destabilising the unit further, and industrial relations problems had increased.

It is not easy to isolate the reasons for the apparent lack of success for quality circles in the unit. Certainly, the context of the unit will have had a destructive influence. There are other reasons which could be put forward to help provide a more complete explanation.

The quality circle programme began on an informal basis, with no training in problem-solving techniques for members. Lack of tangible achievement was also a feature, with individual circles having difficulty securing management interest in their ideas. Ex-members report an inability to inspire enthusiasm in management and engineering at all levels. Lack of success as perceived by participants lowered the quality circles resistance to outside forces apparent in other units.

2. Unit 14

This unit produced varieties of quartz crystal components, manufactured according to simple production processes, but using skilled labour in some key areas. The unit had many different customers world-wide, but sold a considerable proportion of its output to other parts of STC. The market is fairly resilient and Unit 14 had little difficulty attracting orders. Inflexibility came instead from the unit's production capabilities, and the impetus was towards increasing efficiency to effect expansion.

To this end, drastic restructuring had taken place before the research programme began. The work-force had been slimmed down and new lay-outs devised for production and office areas. Management changes had also been frequent with three unit managers in post, in as many years.

This period of change had now stabilized. Shop-floor foremen had been replaced by product engineers with supervisory responsibilities. The quality circle programme had soldiered on in reduced form through the changes and a period of expansion then began which was sustained throughout the research programme. It is clear that uncertainty in unit performance did not have the same impact in Unit 14 as it had in the other Harlow unit.

Quality circle performance in Unit 14 compares favourably with others, as the programme has weathered change fairly well. The "facilitator" (overall coordinator - see Chapter 2) took an informal approach to his programme, which seemed to inspire a confident, relaxed attitude to quality circles. A key factor in its continued existence over difficult times seems to be the effort to ensure some form of activity was sustained and the programme was not allowed to lapse completely for any period of time. Thus some form of credibility remained. Lack of permanent leadership, however, has taken its toll. The programme of delayering referred to in Section 1.3 had left engineers in charge of production areas and thus as the natural candidates for quality circle leaders. This was a task they discharged with reluctance at times, since a conflict was perceived between company role and quality circle leadership. The trend was for these to opt out in favour of members acting as leader, or the facilitator taking charge of the group.

Low perceived achievement had again been a problem, resulting in a low impact on the Unit. This situation was beginning to improve by the end of the research programme.

Great Yarmouth

1. Unit 32

This unit was really two, made up of two factories a few hundred yards apart producing different types of the same component. At shop-floor level, contact between the two factories was minimal, only engineering was common to both. Products are also quite different, one producing established, 30-year old product lines for specialist customers, and the other

manufacturing more recently developed components for the micro-electronics industry. This second factory experienced less stability as a result.

In the Unit as a whole the ratio of engineers to shop-floor production workers was high, as operators were relatively low-skill compared with other units in the study. Product runs were fairly small and some were custom-made to suit customer specifications. Redundancies in the past and low recruiting meant an ageing work-force, which was not very adaptable to change and less than amenable to new and more sophisticated production techniques. Towards the end of the study, however, recruitment had resumed in at least one of the factories, thus diminishing these unit characteristics.

The Unit was fairly small and had only been a separate entity from November 1981, being previously part of a unit based at Norwich. A new unit manager was appointed at that time, whose approach was described as open and participative.

Quality circles had not been an astounding success in the Unit. One had been formed in each factory, but both had a chequered career. Many of the problems experienced were attributed to unsupportive middle management and unenthusiastic supervision. This is surprising, since the Unit had taken great care to involve management and engineering from the beginning and were unique in giving formal training for these people.

There had been an unfortunate incident, however, where a quality circle had worked on a cost reduction exercise, based on data obtained from an engineering department. Having arrived at a conclusion and taken great pains to produce an acceptable presentation for management, the quality circle was pre-empted by

engineers presenting the same cost reduction figures to senior management, thus taking all impetus from the quality circle presentation. The circle in question did not survive this incident.

2. Unit 34

Unit 34 was the remnants of a huge manufacturing operation once employing over 600 people on one product alone. The emphasis had shifted from mass production of established, traditional components to the small scale production of sophisticated up-to-date circuitry using the latest technologies in production.

The Unit had experienced poor performance in the past, but had recently begun to break even, with possible profitability on the horizon.

A new, modern shop-floor layout created a pleasant working atmosphere. During 1982, expansion took place in production areas and a "clean" area was created for the most advanced product lines. Laser technology was also introduced. Overtime and Saturday working became an essential part of the working week, and engineering was becoming increasingly involved in day-to-day production needs.

Quality circle expansion was working in parallel with favourable unit performance. Successful quality circle activity had been associated with traditional electro-mechanical products, but these were abandoned in favour of the new generation goods. Fortunately, for the circle programme, new quality circle activity accompanied the shift in manufacture. The main threat to the quality circle programme in 1983 was lack of staff time to pursue activity fully. Communication flows between quality circles and

those not involved had been spasmodic. Engineering, in particular, had very little awareness of QC activity and were less than enthusiastic.

Paignton

1. Unit 21

This unit enjoyed perhaps the greatest stability of all. It considered itself a market leader in its field, producing many versions of a component much in demand in communications industries of all types. Solid state micro-technology necessitated a move into specialist markets which need a quality of performance "microchips" cannot deliver. There are many competitors, but similarly a great deal of market potential to exploit, particularly overseas.

Skill levels in the Unit were very high on average, with the majority of unit personnel being at the top of STC's skill grades. Products tended to be complex, requiring a large amount of engineering involvement. The climate of industrial relations at the Unit was favourable.

The quality circle programme at Unit 21 was widely held to be the most effective in the Company. Although the number of circles varied, a core of groups continued throughout the programme. It was here that the quality circle programme was integrated most closely into the unit organization. Uniquely among the units studied, there was formal budget provision for quality circles so that their activities did not cut across departmental budgets. This gave the circles an independence not enjoyed elsewhere. Obviously, the amount allocated was relatively small, but it did

allow for extra activities not seen elsewhere, such as social events following presentations and other small rewards for participation.

Unit 21 was also unique in that quality circles began to mature and grow; only in Unit 14 did a similar pattern emerge, but not in as advanced a form as at Paignton. By 1984, quality circle members were taking part in the direction of their own programme, had developed a network of "associate members" and had moved into new project areas. This does not mean however that the programme did not have its problems. Middle management and engineering had constantly constituted a block to quality circle progress. Attitudes were gradually being changed, mostly due to the quality circles' determination and an effort to win "converts" one at a time.

Stability in the unit must be a major factor in ensuring this level of success although that does not mean change did not occur. The reason for success may well lie in the high skill levels of the shop-floor, such that individuals feel they make a significant contribution to the output they produce. Assembly work in the unit was complex and demanded far more of the operator than the routine work done, in say Unit 13. Perhaps this led to a more sophisticated understanding of the product, anyway, which would make discussion in quality circles relatively easy. A common complaint in other units was the difficulty in selecting appropriate topics to work on which could stimulate productive discussions.

Frequent achievement strengthened the quality circle programme and the large number of circles shielded the problem areas from view. If a unit has four circles and one experiences

problems and disbands, the impact on other circles and the unit in general is likely to be far greater than if there are sixteen in operation.

2. Unit 22

Unit 22 produced small, basic electronic components in extremely large numbers. The fact that the unit turned out mainly "bread and butter" output left the unit highly vulnerable to world markets and put it under constant pressure to compete with the Far East and its cost advantages.

This resulted in a very changeable unit. Three visits were made to the unit and on each occasion, drastic reorganization had been implemented. New shift systems were introduced, redundancies were widespread, job descriptions were altered, and a completely new organization imposed. Operators were assigned to a process and moved between product lines according to work flow and customer orders. A core of the labour force became temporary, employed only for one month at a time, although their contracts were generally renewed for six to nine months.

Before the study began, Unit 22 had a high profile quality circle programme, its success self-publicized in a newsletter sent to other units. Counselling and group discussion made up a large part of the programme in its early stages. A "consultant" system was devised, assigning individual engineers to individual circles to provide regular assistance and support. The unit had even conducted its own attitude survey, designed to gauge attitude change as a result of quality circle activity. Unfortunately, the design of this survey was flawed and insufficiently robust to be used in comparison with the results gained here.

The programme could not ride out frequent changes in the unit, however, and was relaunched several times. There was little continuity between each generation of circles, although valiant attempts were made to maintain a coherent programme. By the end of this study, a new programme had begun and was in its infancy.

This section has summarized the main features of each unit and of its quality circles. It can be appreciated that change was a key feature in all units. The six units were originally selected to provide three stable and three changeable units, balanced in terms of their technologies and skill levels. These criteria quickly became obsolete as the characteristics of units changed dramatically over the year.

This section is intended to set the study in context and show how it was planned. The next two chapters now fill in the background to the study, before going on to describe the research programme fully.

CHAPTER 2 - THE QUALITY CIRCLE

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CHAPTER 2

THE QUALITY CIRCLE

2.1 Introduction - General Definition

A quality circle is a problem-solving group made up of people who normally work together. It is formally established by management and attempts to identify, analyze and devise solutions for problems occurring in the course of everyday work, using basic, statistical tools. The most common focus of a quality circle is, as the name suggests, issues relating to the quality of the product, process or service the group produces, although the scope may extend beyond this. Quality circles originated in their current form in Japan, adapted from concepts of quality control initially formulated in the United States and taught to the Japanese as part of the rebuilding of their industry after the Second World War. They were re-exported to the USA about ten years ago and crossed the Atlantic to Europe a few years after that. Quality circles are widely used in: Japan and other parts of South-east Asia; developing countries such as India and Brazil; the United States; France, West Germany, Scandinavia and the UK; and, to a lesser degree, some Soviet Bloc countries (Juran, 1980).

Quality circles can vary in size from as few as two up to twenty members, but it appears the most usual size is between six and ten. One of the group members acts as leader, with a dual role of chairing group meetings and of servicing the group outside meetings: securing resources, collecting information, ensuring cooperation from others, and so on. It is customary for the leader to possess the authority to carry out leadership tasks inherent in

his job, so most often he will be the supervisor of the work area in which the circle operates, although this is not always the case.

Quality circles are found in many different types of organization and are formed among varied types of personnel. Most attention in the literature is directed to blue collar circles in manufacturing industry, but they have been used successfully among groups of clerks, engineers, accountants and managers (see, for example, Matsuura, 1983; Bishop and Gunz, 1982). Quality circles are also working in distribution and retail organizations, banks and other service industries (Aubrey and Fenc1, 1982). They are most commonly used in larger, joint stock companies rather than in smaller firms, as they require a considerable investment of resources in order to function effectively and the pay-off is neither qualifiable nor certain. Quality circles represent an investment with considerable risk attached (Wood et al., 1983).

The quality circle meets on a regular basis, the frequency and time often set when the group is formed. The conventional formula is a weekly meeting lasting about an hour, but this will vary according to circumstances, technical systems, working hours and so on.

Meetings are conducted on the basis of equal participation from all members, and leaders are given training in group dynamics to help them encourage all members to contribute. Decisions are made by consensus - with the consent of all members - so that all are committed to group decisions.

Projects are selected from the work problems which members have identified in the area and can cover such things as: unacceptably high reject rates, problems with machines and

equipment, housekeeping or poor communications. Circles are encouraged to collect data relevant to a chosen problem and to use it effectively to define and describe the problem as well as to test for possible causes and solutions. When this process is complete, the preferred solution is drawn up, tested and presented to management as a formal proposal. If accepted, it will be implemented through normal channels.

Having described the quality circle in outline, it is useful before moving into greater detail, to consider the history and development of the phenomenon.

2.2 Origins of the Quality Circle

2.2.1 Introduction

It is a widely held assumption that the quality circle is a Japanese invention, although some writers would challenge this and claim that the idea was originally formulated in the US (Rieker, 1983, for example). What is not in dispute, however, is that the concept was first developed in its present form and put into widespread practice in Japan.

The quality control circle, to use its full Japanese name, has its roots in conventional organization theories of management and in quality control techniques already in world-wide use. The first inspiration, however, was to educate the individual foreman in quality control techniques, and a national training programme was launched in Japan to this end (JUSE, 1980). This led to the development of the quality circle, as quality control knowledge was disseminated at shop-floor level. From the establishment of the awareness programme in 1962 up to 1979, over 100,000 quality control circles had formally registered with Quality Control

Circle Headquarters in Japan, with an estimated one million circles unregistered (JUSE, 1980). This represents between 10 and 12 million of Japan's work-force (Cadwgan, 1981).

Before going on to describe the present state of quality control circles in Japan, it is useful to consider the background to their existence in Japanese industry.

2.2.2 The structure of Japanese industry

Post-war renovation

It is well documented that after the devastation of Japan at the end of the Second World War, America was instrumental in rebuilding and reshaping Japan's industry. There were undesirable aspects of pre-war industrial structure in Japan, for example, an over-concentration in manufacturing and finance sectors and a tendency for poor quality products, which it was thought desirable to remove (Hirschmeier and Yui, 1981). Thus the large industrial combines, the "Zaibatsu", were dismantled and the foundations were laid of the giant corporations which were to take their place.

As well as helping the Japanese to rebuild industry, American experts acted as consultants to help them develop efficient management practices. Quality control was one of the techniques taught by leaders in the field such as Deming, Juran and Shewhart. One of the most influential approaches was that of "total quality control" which involved the participation of all organizational members in the regulation of quality (Juran, 1974). It is from this approach that quality control circles have developed. Meanwhile, Shewhart's work (1931) has been the inspiration for the problem-solving techniques used in quality

control circles today, and a Dering Prize for quality control activity has been established in Japan for many years (Pabst, 1972).

Current industrial structure

The current industrial scene in Japan is of several large industrial groups who are cartels of manufacturing companies, sub-contractors, service organizations, distribution outlets and financial institutions. Such groups are based on recognized interdependence rather than on mutual shareholding, and cooperate in planning and policymaking. In 1974, these groups accounted for 187 major companies and 22% of total share capital. If the other companies of which they hold at least 10% of the stock are included, then they comprise 41% of total capital stock (Hirschmeier and Yui, 1981, p. 335).

A dominant feature of Japanese industry is the system of captive sub-contractors and suppliers. A large "parent" company will use a network of smaller firms as suppliers and purchasers of their goods and services, thereby taking advantage of the smaller companies' lower overheads, particularly fixed labour costs. This relationship does confer certain benefits on the captive, however, as they are often given use of the larger firm's expertise and facilities.

This split in the structure of industry is often termed "industrial dualism" and has resulted in many inequalities within the Japanese Economy (Broadbridge, 1966). Smaller firms tend to bear the full weight of any changes in the economic climate, and will tend to shed labour freely in times of recession. This allows larger firms to promote the much discussed "lifetime employment

system", as these can pass the impact of adverse economic circumstances on to their satellite firms without the need to cut personnel.

Such a structure is encouraged by a benign government who seemingly wishes to avoid an excess of competition. Encouraging mergers, together with this dual structure, acts as a limit on growth which has been a priority in recent years.

Such things have led to the notion abroad that such intervention has been wholly successful, and favourable policies have given Japanese industry an edge over its competitors. This may not be the case. The Japanese Government's aim in structural intervention, the Ministry of International Trade and Industry (MITI) has had some failures in the past (Drucker, 1981) and this agency's importance as the main contributory factor to Japan's success may be overstated (Martin, 1984; Johnson, 1983).

2.2.3 Management style and methods

The most striking feature of Japanese management is the "ring" or consensus method of decision making. Impetus for decisions is encouraged from the bottom of the hierarchy, as contrasted with the "top-down" approach of Western firms (Pascale and Athos, 1982). There tends to be little clear distinction between policy-makers and middle and lower managers who implement such policy. Planning and coordinating functions are carried out at all organizational levels (Johnson and Ouchi, 1974). In addition, there is a concern for all aspects of subordinates' welfare, which extends beyond the comprehensive health and recreational facilities provided to an interest in individual problems outside work (Dore, 1973).

Inter-firm mobility among Japanese managers is low, individual managers sharing the view of all employees that their interests are best served with one employer (Bishop and Gunz, 1982). Consequently, they tend to adopt a more long-term view than their Western counterparts, who need to prove themselves as successful in the short-term in order to keep their job (Pascale and Athos, 1981). This tendency to gear the company to maximize future, as well as current, benefits lies behind much of the Japanese approach to managing the enterprise (Ishikawa, 1981; Clarke and Banks, 1983).

Production systems

Japanese production methods have received an increased amount of attention in recent years. The Toyota "Kanban" or "Just in Time" production system operates on minimum inventory, as a way to avoid wasting capital tied up in stocks (McArthur, 1984). Housekeeping is to high standards and production is carefully planned to prevent machine overload and to avoid crises (Hayes, 1981). Automation has been an important factor in streamlining operations and enabling companies to increase productivity without expanding the labour force with its accompanying costs (Karatsu, 1983)

Production systems overall are geared to achieving maximum possible economies of scale and the optimal utilization of resources (Clarke and Banks, 1983). There is an integration of operations and strategy which enables the firm to adapt to dynamic conditions effectively (Wheelwright, 1981).

Quality control is fully integrated into the production system and is highly sophisticated in conception. It extends into marketing, purchasing and product design, and responsibility for

production line quality rests with manufacturing rather than within a separate functional specialism (Juran, 1979). The belief in Company Wide Quality Control means that all members of the organization are expected to contribute to an overall goal of high quality, and are given formal training to reinforce such behaviour (Ishikawa, 1979).

Employment relationship

In major Japanese companies, employer and employees are party to a unique relationship. Employment is extremely stable, with few dismissals and a planned annual intake of employees who have satisfied an absolute standard of attainment. Once employed, an individual can expect to remain with the firm as long as he wishes, an expectation which is shared by his employer (Dore, 1973). Accordingly, reward is long-term, pay increases being based on seniority rather than individual characteristics, and a large proportion of the pay packet comes from an annual bonus linked to group productivity (Hirschmeier and Yui, 1981). Flexibility is maintained by recruiting a sizeable proportion of temporary workers who will be paid less than their full-time colleagues, even though they may do equivalent jobs. As previously mentioned, flexibility is also achieved by the judicious use of sub-contractors (Cole, 1979).

Lifetime employment also confers many other benefits, seen as rights rather than the rewards of a paternalistic management. Extensive welfare facilities are provided and infinite care is taken to ensure that every aspect of well being for the individual is attended to. Satellite companies may also have use of these facilities.

A notable result of this lifetime employment system is a dual labour market. Those who are full-time and therefore enjoy the entire benefits of the system, are usually found in large manufacturing firms, service industries and government departments. Dore (1973) estimates that they account for about one-third of the total labour force and earn just over half of total earned personal income (Dore, 1973, p. 305). The remainder constitute married women, retired employees retained by the company, those working in small firms and non-unionised labour. Dore also estimates that in 1970, workers in firms with between 5 and 29 employees enjoyed wages of only 62% of those in firms with 500 or more staff (ibid, p. 303).

This employment relationship is based on a group philosophy which emphasizes collective goals achieved through the individual's commitment to communal interests. Accordingly, industrial relations tend to be more ritualistic than adversarial, with an emphasis on shared values and goals rather than on confrontation.

Transferability

Enthusiasm for Japanese industrial practices has been high, and criticism is hard to find. This has led to an eagerness to adopt Japanese practices in the West (see, for example, Ouchi, 1981) and it is an interesting diversion to consider the appropriateness of this transfer. It has been found that Japanese firms operating in the United States have had some success in applying Japanese organizational practices (Johnson and Ouchi, 1974; Hatvany and Pucik, 1981). White and Trevor (1983) found that Japanese firms in Britain have had a favourable response when applying their own brand of managerial technique.

Pascale and Maguire (1980) tried to determine whether Japanese firms operating in the United States would become "westernized" in approach, supporting the hypothesis that management practices are transferable across cultures. They concluded tentatively that there was more evidence to support cultural convergence than divergence. Everett and Stening (1983) disagree, finding that Japanese and British managers value different managerial styles, question whether Japanese techniques may be transferred. Dore (1983) echoes this view, claiming that the British employment system and organizational climate are patently unsuited to Japanese practices which are based on different assumptions.

Despite these reservations, there are those who eagerly advocate the importation of the Japanese style, even to the extent of completely restructuring an organization (Ouchi, 1981). The fact that quality circles, in particular, are still operating in the West, would seem to suggest that some aspects of the Japanese way at least have a degree of transferability.

2.3 Quality Control Circles in Japan

Quality control circles, then, grew out of a national impetus for the betterment of quality. They were initiated at national level in fact, under the auspices of Quality Control Circle Headquarters, who defined the basic ground rules for their activities which still apply today. To the Japanese, quality control circles embody three basic ideas:

- "(1) contribute to the improvement and development of the enterprise;
- (2) respect humanity and build a happy bright workshop which is meaningful to work in;

- (3) display human capabilities fully and eventually draw out infinite possibilities." (JUSE, 1980, p. 19)

By exploiting these principles, the individual worker is encouraged to make his contribution to the improvement of company-wide quality control, which is the ultimate end of quality circles.

National level activities

Quality Control (QC) Circle Headquarters commands a sophisticated network of QC circle activities throughout Japan. As well as a committee at national level, there are eight regional headquarters, mostly run by volunteers from private companies in the area along with academics (Ishikawa, 1979). QC circle conferences are regularly held. Competitions are held to find the best quality circle project of the year, and the prize winners are rewarded with an overseas tour to promote QC circle activities (Pabst, 1972).

Company level activities

QC circles are being used by a substantial number of leading Japanese firms (JETRO, 1981) and are formed mostly out of blue-collar workers (Cole, 1984), although the move to white-collar QC circles has recently begun (Smith, 1980). They tend to be fully integrated into the existing company organization, and there is less emphasis on formal quality circle roles than in the West (JETRO, 1981; Hartley, 1981). They may often work within existing company objectives, such as meeting productivity improvement targets, as well as choosing their own problems (Collard, 1981a).

Groups are organized on a voluntary basis (JUSE, 1980) but there tends to be great pressure on workers to belong to the groups (Cole, 1980) and to participate in their own time rather than at work, which means that, in some cases, members regard their QC circle involvement as burdensome (Cole, 1981). Pabst (1972) reports that in 1969, 45 percent of QC circles held meetings after work, and of these 73 percent received allowances such as overtime pay and free meals. Pabst concludes that Japanese companies absorb from one-half to two-thirds of the labour costs of QC circle activities, while the members carry the rest (ibid, p. 16).

There are many records of QC circle activities in Japan which emphasize the success of individual quality circle programmes (for examples, see Hartley, 1982; Hollingum, 1980; JETRO, 1981; Collard, 1981a; Matsuura, 1981). Failure is rarely mentioned; Cole (1980) claims that:

"Circles do not work very well in many Japanese companies. Even in those plants recognized as having the best operating programs, management knows that perhaps only one-third of the circles are working well, with another third borderline and one-third simply making no contribution at all." (ibid, p. 30)

It seems that quality circles in Japan may not be the success story they have been made out to be, although Cole stands virtually alone in his critical view of them.

It is perhaps telling that QC control activities are being supplemented and replaced with an idea known as "Zero Defect Programs". These work in a very similar way to quality circles, but single-mindedly seek to eliminate defects from all parts of the job, rather than merely reducing them, or smoothing

operations, as QC circles do (Pavsidis, 1983). "Zero Defects" has become as widespread as QC circles, involving 5 million people (Oates, 1974).

2.4 Quality Circles in the United States

News of quality circles began to filter into the United States during the late 1960s but it was not until several years later that the first experiment began, at Lockheed in 1973 (Amsden and Cleary, 1982). The success of these first quality circles prompted other firms to follow suit, especially when Lockheed training material became openly available (Dewar, 1979).

It is difficult to determine exactly how many quality circles exist in the US, or how many companies are running successful programmes. Cole (1980) claims that more than 100 firms are using QCs on an experimental basis. A coordinating association, the International Association of Quality Circles (IAQC) has been established and in 1983 the Association had 5,000 members and 71 regional chapters (Mohr and Mohr, 1983, p. 20).

Case studies show how quality circle programmes have been organized and detail some of the projects which have been successfully tackled by groups. Reports of American experience of quality circles do tend to be more broadly-based than those of Japan, including such things as attitude change (Dewar, 1976) policy implications (Boedecker, 1983) and union reaction (Main, 1984) as well as suggestions made and cost savings generated. The motivation and morale aspects of quality circles are continually stressed, giving the impression that American firms regard these benefits from quality circles as being at least as important as material gain (Mroczkowski, 1984). Wood et al. (1983) review the

literature of quality circle performance in the US and conclude that there have been many failures, and some programmes which operate but are ineffective. They stress the need for an evaluation of the quality circle model.

It is not necessary to go into a great amount of detail on this subject, since it is well documented in the above references and in recent research in the US (see, for example, Cole, 1979). Although quality circles were brought to the West by American industrialists, there is no evidence to suggest that the United States has been the model for quality circle developments elsewhere; most seem to look for inspiration at source - in Japan (Lorenz, 1981a).

2.5 Quality Circles in the UK

Quality circles were first introduced to Britain by Rolls Royce at Derby and Ford of Europe in the later 1970s. Both firms chose to diverge from the conventional quality circle approach, using mixed circles of workers, engineers and foreman. Rolls Royce began to claim dramatic success - savings of £525,000 in 30 months as a direct result of circle activity - but Ford's programme quickly ran into problems (Lorenz, 1981b).

Other firms began to follow the lead from about 1979. Morland (1982) reported that 100 British firms had begun quality circle programmes, including many of the most influential concerns - BL, Marks and Spencer, Mullard and Wedgwood - and American companies began to introduce circles in their UK operations (ibid, p. 6). Bartlett (1983) shows evidence that many American subsidiaries were running more successful quality circle programmes than indigenous companies, although Bartlett's sample was rather too

small to permit firm conclusions to be drawn. Currently, at least 200 companies are using quality circle programmes (Dale, 1984) and the spread into service organizations has already begun (Dale and Lees, 1984). By contrast, the movement of QC circles into Japan's white collar and service sectors has been relatively slow (Cole, 1981).

The British model for quality circles is perhaps nearer the Japanese original than the US version which, in fact, inspired UK firms. Wood et al. (1983) note that many firms in the US place greater emphasis on group dynamics and morale benefits of quality circles than the Japanese; scanning articles published by practitioners in British professional journals points to a greater interest in the technical aspects of circles (see, for example, Hutchins, 1981c).

Details of quality circle organization in the UK can be found in research conducted by Dale and his various associates (1983, 1984) and Bartlett (1983). Companies range from those which are willing to institutionalize the quality circles from the beginning, to those which attempt to introduce programmes "on a shoe string" and which orientate their quality circles towards cash results. All the above research seems to indicate, although none is without flaws in methodology and take considerable liberties in interpretation, that companies who shy away from a bold commitment from the first or who expect to observe dramatic improvements in company performance to ensue immediately, are those who are unable to sustain a successful quality circle programme.

Experiences of individual companies using quality circles are widely available. Institute of Mechanical Engineers (1981), Fletcher (1982), Lewis and Rooney (1981), IRR (1972), Barber (1982), Hollingum (1980) and Edmonds (1980) all outline the experiences of British companies who have introduced quality circle programmes, and many report the experiences of circle members as well as detailing financial successes. Jaguar Cars have used quality circles for some time (IRR, 1982) and Hancock (1984) tells how successful their company-wide quality programme has been in reversing poor fortunes.

It seems that failure has been common in this country. Dale (1984) reports that out of 86 firms surveyed in 1983, only 40 were known to be still operating quality circle programmes a year later. Bartlett (1983) contacted 108 companies who had sent delegates to a seminar on quality circles; only 28 of these companies had started circle programmes in the ensuing 12 months, and 10 of these had already come to grief. Out of the remaining 18, Bartlett could only categorize 11 as "successful" in the sense that they are "expanding and in general effective" (ibid, p. 8).

An analysis of quality circles must not rely too heavily on individual reports of success and failure, since not enough is known about how such judgements are made. Much of the research and scholarship on quality circles in this country have concentrated on details of quality circle organization rather than on key issues; the work by Bradley and Hill (1983) being a notable exception. The way is clear for a more incisive and objective approach to quality circles so that their effectiveness can be properly judged. The form and impact of quality circles themselves

should become the focus of research effort, rather than the programme of implementation and the structure of quality circle roles.

2.6 Individual Involvement in Quality Circles

Everyone in the organization is, or has the potential to be, involved in a quality circle programme. A network of roles has been established in a quality circle framework, and these roles are filled by people at different hierarchical levels.

2.6.1 Definition of organizational groups

For this purpose, it is possible to assign organization members to several broad categories, outlined below. These definitions are not intended to be of general applicability to management theory, although of course they are derived from it; they merely serve to clarify what meaning is intended when various groups are referred to, to avoid confusion and ensure accuracy.

Senior managers

These are distinguished from other managers by their position in the organization. Job titles will differ between companies, but it is possible to draw common strands. Senior managers are those responsible for setting overall company or departmental objectives, devising long-term strategic plans and policies and so on. They provide the main impetus for managerial work.

Middle managers

This is a wide-ranging group, encompassing all those who fall between senior manager and first level supervision in the hierarchy. In service functions, such as industrial engineering, accounts, sales and so on, the group will cover those whose main role is to perform managerial tasks.

Technical staffs

These are those who are employed in service functions and have expertise in a specialist skill - an industrial chemist, a production engineer, or an accountant. Technical staffs are required to carry out tasks according to their own expertise and will have limited line authority.

Supervisors

These are first level managers who have authority at the lowest level across the organization. Supervisors do not just include those in charge of shop-floor production workers; the term may also refer to supervisors of clerks, typists, canteen staff, shipping departments, inspection and test, stores, or whatever the precise context.

Workers

This is a simple generic term to refer to those who are at the bottom of the organizational hierarchy and who have no authority within their own department. As with supervisors, they may belong to any kind of work area, and do not just relate to "blue collar" workers.

These groups have been sketched in fairly loose terms, but in all cases it is the relative status in the hierarchy which is important in terms of quality circle organization rather than the exact content of jobs and roles, as will become clear below.

2.6.2 Quality circle organization

Quality circle organization mirrors the organization structure in the terms set out above. There are a number of formal roles prescribed in a QC programme, and there are ground rules which are generally followed when deciding who will fulfill each role in a company implementing a programme.

Many large companies can be expected to use a management consultant to introduce the quality circle concept to the company (although there is no^{detailed} evidence to be found about how many companies do use them). The fact that several quality circles consultancies do exist and are thriving, however, is a testimony to their popularity. The exact nature of the quality circle system a company will use will thus be a function as much of the consultant used as of the unique style of the company concerned.

The quality circle

The focal point of any QC organization the actual QC, requires the participation of workers and supervisors. The most commonly advocated format is for the departmental supervisor agreeing to lead a group, receiving training in QC techniques and group dynamics skills for this role, and then seeking for volunteers to become members. The leader is encouraged to act as a participative leader to help meet group objectives. The leader will ensure the group convenes as necessary and that it follows the guidelines established for QC activity, in terms of problem-solving methods, decision-making processes and use of organizational channels. He will also secure all the resources required for successful operation; skills (given through training of members as well as using outside help); information (generated by the QC or derived from outside help); materials; time (that is, release from normal duties for all involved); a meeting place; sufficient and appropriate aiding roles. The leader will also liaise with other members of the organization as necessary, and will often represent the group's interests in the QC structure.

A mature leader will not always perform all these functions himself, but will delegate some tasks to members.

The members will use their skills and abilities to contribute to the circle's objectives and will agree to conform to the group's imposed norms (as introduced to them in training) - equal participation of members, a continuously constructive attitude, respect for others' opinions and their right to express them, commitment to the group and to company goals.

Thus there is a prescribed leadership role coupled with a prescribed followership role, the latter being better defined than the former.

It is not strictly necessary for the quality circle leader to be a supervisor, although it is thought to be the best formula. This follows the assumption that supervisors will already possess the qualities needed to perform the leadership role effectively (Robson, 1982a). This gives the group the best chance of success in its early stages. It is permissible for one, or several, of the members to take over the leadership role later in the circle's life, when members are sufficiently familiar with the QC process to take it on (Mohr and Mohr, 1983).

It is also possible that a supervisor may not be willing to head a QC, although the formation of a circle in his department is thought desirable by management. There may even be pressure from workers to start a QC, but the supervisor is unwilling, or is already leading a group. In such instances, non-supervisory leaders are necessary in order for a circle to be formed and, provided they have existing experience either in QCs or in a comparable situation, then non-supervisory leaders have been seen to make effective leaders. A survey of the Japanese steel industry revealed that 41.7% of quality circles included in the study were led by shop-floor workers (Collard, 1981a).

There may be other roles in existence in the quality circle, but they are unlikely to be formally laid down. Some companies encourage circles to keep records and to minute meetings (IRR,1982), and one member may undertake this job. Others may specialize in data collection, or presentation of material, and so on, whatever the skills of the individual members prescribe. In fact, one US firm, assigns formal roles of this kind to each member, and structures its QCs so that a representation of the required roles is obtained (Macdonald, 1982).

An additional role in the quality circle may be that of "consultant". This will be filled by a technical specialist whose area of responsibility overlaps with a major proportion of the QCs task work - for example, in a factory organized on product, may well benefit from the close involvement of the production engineer assigned to that product. It is not recommended that this is a permanent arrangement (Hutchins, 1981b), as the temptation to dominate meetings is great. Thus the benefit for the members of producing solutions for which they can claim full credit and derive achievement satisfaction from, is diminished.

The facilitator

This facilitator is the overseer of a group of quality circles and their activities. He will be appointed at the beginning of a programme's life and will be instrumental in setting up the programme and ensuring its effective running (IPM, 1982). A typical list of the facilitators duties will include:

- giving presentations on QCs to organization members as required.
- soliciting cooperation and support from all organization members for the quality circle programme.

- securing volunteers for the establishment of groups.
- training quality circle leaders and members.
- providing resources and materials.
- dealing with operating problems.
- assigning consultants and aiding roles.
- ensuring information about QCs circulates in the organization.
- provides communication and feedback.
- provides liaison between quality circles and management.
- provides support for leaders and members and encourages individual development.

This is by no means an exhaustive list; responsibilities may vary between companies.

It is generally accepted in the literature that the facilitator role is perhaps the most significant in quality circle organization (Hanley, 1980; Amsden and Amsden, 1980) to the extent that it is wide-ranging and also crucial to the effective operation of the groups.

Although there is agreement about what the facilitator's role should be, there are differing opinions about how the duties should be carried out. There are, in fact, two different types of facilitator to be found in use - those who do the job part-time and full-time.

Part-time facilitatorship

A part-time facilitator is usually from the ranks of middle management or technical staffs. He is expected to perform his QC duties as an adjunct to his normal job, preferably as a volunteer (Robson, 1982a). In this school of thought, a number of advantages are claimed. Facilitators fully integrate their quality circle

role with their organizational role, thus helping promote the image that quality circle structure is a full part of the organization rather than as a special programme or scheme with a limited life. Understanding and knowledge of quality circle activities can be passed on to other managers using the existing formal communications network. Informal relationships built up in normal work can also be capitalized upon when eliciting support for quality circles, making the task of facilitatorship easier.

In addition, a system of part-time facilitators permits the easy transfer of the job from one individual to another as required, thereby giving the potential to involve more people (Constable et al., 1980).

It is possible to use the the facilitator role to develop individual managers and trainees (Tate, 1982); facilitatorship necessitates the adept use of interpersonal skills and provides contact with a wide range of members of the organization (Mohr and Mohr, 1983).

There are, of course, disadvantages attached. A facilitator will be required to devote a large amount of time to QC activities especially in the early stages of the programme. Robson (1982a) predicts that in a programme's infancy a facilitator will need to spend a half-day per week per circle for up to three months (ibid, p. 78). Robson predicts that this time will diminish to virtually nothing after 6 months when a QC has become self-sufficient. However, a QC will not necessarily be self-supporting after so short a time. It may still be necessary to spend up to a half-day every week on the QC programme almost indefinitely. Clearly, a manager will already have considerable responsibilities to

shoulder, and may find it impossible to spare such an inordinately large proportion of his time on something which is considered an extra part of his duties.

Full-time facilitatorship

This requires the appointment of a practised manager, usually from within the organization (IPM, 1982) who undertakes the duties on a full-time basis and thus give the job his complete attention. It has been recommended to have a full-timer in the start-up phase of the quality circle programme, when concentration of effort will be greatest (Tate, 1982).

A full-time appointment will require greater commitment to the quality circle idea on the part of management (in terms of the allocation of resources), but this may be beneficial in the long-term, creating an impression of permanence.

The choice between part-time and full-time will depend on situational factors. There is some ambiguity in the literature as to the scope of a facilitator's responsibilities. In some companies, such as the one studied in this research, there is one facilitator assigned to each factory or location, who is responsible for all the circles which start-up in that area. As the number increases, so he may be allowed to recruit an assistant, or may choose to develop a consultant network to remove some of the burden. In others, there are several facilitators, the number being determined by the number of quality circles in the plant or location. It will be company policy that one facilitator handles up to, say, four quality circles and the groups will be allocated to various individuals as the programme expands. This type of facilitator will most likely be part-time, however.

It is difficult to find any terms which are in use to distinguish between the two types. For this purpose, therefore, "wide-span" will refer to the former and, "narrow-span" to the latter.

There is no empirical evidence to determine which of the facilitator options is most appropriate in a given context. Accordingly, it is not known which is the most used in practice.

The identity of the facilitator will depend largely on available personnel as much as personal skills, although interpersonal expertise is considered more significant than line authority (Robson, 1982a). Experience seems to suggest that an individual without line responsibility is best able to do the job. They have more flexibility in planning their time, being less constrained by the demands of production or man management and so can respond more readily to the needs of circles. Equally, lack of direct line responsibility over circle members will ensure relationships are freer. In his research of quality circles in the UK, Dale (1983) found that 65% of firms surveyed use facilitators from staff functions, while only 23% come from production departments (ibid, p. 12).

The Steering Committee

This is a body which exists to provide support for the facilitator(s) in overseeing a quality circle programme. There are generally two kinds of steering committee in use, a management or a representative committee; each will be discussed in turn.

Management Steering Committee

This type is made up of managers, usually with at least one from senior level (Aune, 1981) who provide the main impetus for planning, coordinating and maintaining an effective programme. The members of such a committee have the necessary authority to make decisions about things such as the appointment of a facilitator or resource allocation. It may also promote activity by solving any difficulties groups may have in obtaining cooperation from various departments, whether requesting information or action. A committee of managers spread across various functions has the potential to correct non-cooperative behaviour from all parts of the company (IPM, 1982).

A major argument for establishing a management steering committee seems to be that it is evidence that management is supportive overall of the quality circle programme and that this management support is a vital component for success (Gryna, 1981). There is, therefore, justification for forming the Steering Committee at the highest possible level. If support is shown to exist at top level by participation in a Steering Committee, then support is more likely to be forthcoming further down the organization (Hutchins, 1981b).

Representative Steering Committee

This is made up of people from different parts of the organization and quality circle network. It may be representative in terms of departments and/or organizational level. Thus there may be in addition to members from middle or senior management; facilitators, consultants (either full-time or occasional), supervisor (not involved), trade union representatives, quality circle leaders and members.

Representative Steering Committees are thought to be more consistent with the quality circle philosophy of "participation for all" and an effective way of ensuring that all interested groups are involved (Mohr and Mohr, 1983). It is likely, however, that such a committee would need to be given specific authority to act in certain areas, as all departments may not be represented at a sufficiently high level.

There is little evidence available on the use of Steering Committees, on which kind is the most effective, or how they contribute to QC effectiveness. Dale (1983) found that out of a sample of 86 UK companies using quality circles, 70% had established a Steering Committee, so they would seem to be in fairly widespread use. Dale's sample may have inbuilt bias however, since he has used a sampling frame compiled with the help of a management consultant who openly promotes the use of a Steering Committee (Hutchins, 1981b).

Coordinator

This role is intended to exist at the top of a quality circle organization and will be the focal point of quality circle organization (Robson, 1982a). It will be filled by a relatively senior level manager who will perform an overall linking function between quality circle activities in different parts of the organization, and ensure good communications and working relationships prevail.

It is most likely that the coordinator will be full-time, especially if superintending a large programme (Hanley, 1980) and will have the ultimate responsibility for the programme's success

(Mohr and Mohr, 1983). It is possible that the role may only be part-time, relying on the benevolent interest of a senior manager (P.A. International, 1980).

Overview

Thus it is possible to draw up a hierarchy of quality circle roles in much the same way as companies construct organization charts (see Figure 2.1). The exact nature of the relationships between the different roles cannot be determined easily; it will depend on the identity of role-holders. For example, a facilitator may be a senior quality engineer guiding a circle with a consultant who is a quality engineer, reporting to the facilitator. In such an instance, it would be permissible to show a line relationship between consultant and facilitator. If the two were at the same organizational level, then their relation could be no more than advisory. Similarly, the nature of the link between coordinator and Steering Committee will depend on the organizational roles of those involved.

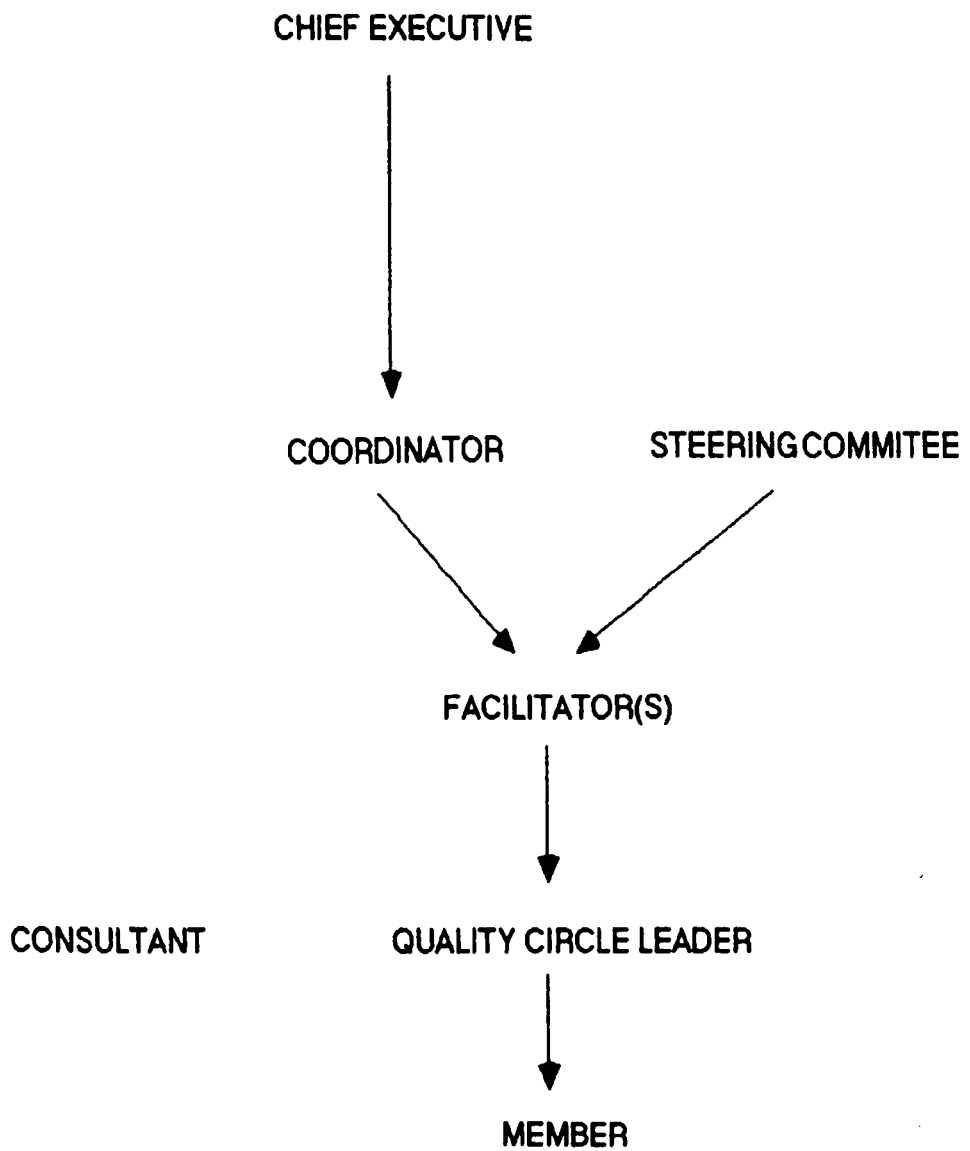
Owing to such difficulties in establishing the exact nature of interrelations, some prefer to represent quality circle organizations as systems (for instance, Bank and Wilpert, 1983).

2.6.3 Individual roles in quality circle organization

Having considered the pattern of quality circle organization, it is worthwhile to outline the role of each of the categories of personnel described at the beginning of this section - senior managers, middle managers, technical staffs, supervisors and workers.

FIGURE 2.1

QUALITY CIRCLE ORGANISATION



Senior managers

As a whole, this group has only minimal direct involvement with a quality circle programme and can be expected to intervene only rarely in the life of a programme (Mohr and Mohr, 1983).

As we have seen, senior managers will be actively involved in a QC programme in two ways - either by fulfilling the role of coordinator or sitting on the Steering Committee. Other managers will be expected to cooperate with the programme, that is, act when required to act and in an acceptable way, and to ensure subordinates do the same (Hutchins, 1981a; Hopkinson, 1981). This is commonly referred to as "management support" in the literature, a much over-used term. Since senior management will set the tone for the whole organization, then their visible "support" is necessary (Cadwgan, 1981).

Perhaps the most significant task senior management must perform, is to introduce the idea of QCs to their company and set up the organization necessary to bring it into practice. Before the initiation process is undertaken, however, it would seem likely that most managers would wish to seek information about quality circles and what they set out to achieve, and then to evaluate the suitability of the concept for their organization.

It seem, however, that this is simply not done in many cases (Jones, 1983). Furthermore, it has been speculated that this undue haste to use QCs without fully investigating the possibilities has resulted in the high failure rate of QC programmes in the UK to date (Bartlett, 1983).

Since management would be expected to carefully analyze investments made in any other part of the business, why the reluctance to apply the same rules to quality circles? A number of reasons can be suggested.

Received wisdom

When discovering quality circles and making a preliminary assessment, most managers will review the large number of articles written in professional journals on the subject. Here they will find frequent references to expected benefits (especially cost savings) from quality circles and something of the costs to be incurred, and the evidence they will find will be persuasive, benefits heavily outweighing costs.

Dale (1983) when trying to discover why firms decided to introduce QCs, found that 78% of his sample had heard of QCs from other companies and through journals.

Some predict benefits in tangible terms, quoting the experience of companies using QCs. Hutchins (1981a) cites Rolls Royce Aero Division who reported savings of £525,000 in 30 months (ibid, p. 27). Others refer to Japanese success stories (Collard, 1981a; Hartley, 1981). Hartley reports that a Japanese steel firm, NKK, developed a QC programme which generated £136 million worth of "potential" cost savings for 1980 which represents 4.26% of turnover (ibid, p. 32). Japanese writers have also presented impressive records of quality circle programmes in action (see, for example, JETRO, 1981) although they are more reticent in quoting cost saving figures. In fact, cost saving is the most often used criterion of success (with occasional references to scrap rates).

It is important to bear in mind, however, that the benefits of QCs are not derived from them alone. As will become clear, a QC programme involves the participation of a wide range of managers and technical staffs in the actual solving of problems and the successful implementation of solutions.

In other words, QCs represent a net addition to the task work carried out in the organization, not a redistribution of work from established problem solvers (quality staff and engineers) to the QCs (except at the level of the most individual problems which represent only a minimal time saving).

Amsden (1983) reports a view that QCs are capable of tackling only 15% of the problems an organization faces at any one time; they can identify a greater proportion of problems, but they are not the most efficient way of solving the other 85%. Other writers favour less tangible benefits, which are less quantifiable. The list of potential improvements varies, but an example can be found in Mohr and Mohr (1983) who list many potential benefits to be measured "qualitatively" (ibid, p. 173). The list includes attitude, personal growth, communications, decrease in interpersonal conflicts and morale. The Institute of Personnel Management (1982) includes attitude change as significant, particularly in the long-term which they suggest can be measured using indices such as labour turnover, absenteeism and stoppages (ibid, p. 94).

The available information on costs, on the other hand, is less easily isolated. Costs occurring from circles can be broken down into two components - implementation costs and running costs. These will consist of material costs, the opportunity cost of time devoted by participants at all levels (intuitively the single

largest component) and the expense of implementation (management consultants' fees and so on). Other areas, such as additional overheads for lighting, heating and so on are likely to be minimal and so will not be a decisive factor. Other less easily measurable costs may be indirect, "knock-on" effects of quality circles which may or may not be incurred. A part-time facilitator, for example, may concentrate a large proportion of his time to his quality circles and his other work will undoubtedly suffer as a result. This may have an adverse effect on company performance, especially in the short-term.

Examples of the costs of running a circle programme are available in the literature. At J. Wedgwood and Sons Limited, it has been estimated that the annual running costs of each QC is £1000, and since the company had 104 circles at this time, the total is quite considerable (Fletcher, 1982, p. 4). This does not include implementation costs, nor presumably, the opportunity costs of a circle programme, although it appears that the production foregone when quality circles are meeting, is included in this calculation. In the US, Federal Products Corporation, have incurred implementation costs of \$60.000 and report running expenses of \$190 per week which are considerably less than those quoted by Wedgwood (Hanley, 1980).

In comparing costs and potential benefits, an expected return on investment in the order of 6:1 is predicted by Cadwgan (1981) and a more flamboyant 15:1 by Robson (1982b). It ^{would} seem probable, however, that in general the benefits are overstated and the costs underestimated (Jones, 1983) such that QCs represent a net cost to the organization. (Wood et al., 1983) give an account of research in the US which has shown that 70% of firms surveyed in fact

experienced a savings to cost ratio less than 1. They also suggest that the observed magnitude of benefits is inflated due to a "Hawthorne effect" (ibid, p. 43). Amsden and Amsden (1980) support this proposal and go further to suggest that this is a desirable outcome of quality circles (although their interpretation of the Mayo studies differs in some degree from the current view).

A management team encountering such writing on quality circles usually possesses little information by which to judge such claims, so it is not surprising that many are seemingly willing to accept the validity of the quality circle approach without closely examining likely outcomes in their own situation.

Vested interests

Another feature of these persuasive claims for success is the tone in which they are written. A number of consultancy firms have grown which specialize in introducing QCs to companies with no experience of them, and many consultants have published articles in professional journals, some of which have been referred to above. It is inevitable that they should write accounts which will persuade the uninitiated to try out the concept, in the hope of generating clients. Unfortunately, therefore, some pieces convey the "how can you refuse?" theme to the reader (Robson, 1982b).

That is not to say that, of course, all material written by consultants does not have some value, but there is a lack of balance which has only recently begun to be corrected. Such evaluations tend to be in publications less accessible to the professional manager which lessens their impact.

Enthusiasm

It would be unfair to say that all unbalanced accounts of quality costs and benefits are the result of cool commercialism, however. Often, it is sheer enthusiasm for the concept which means the writer is less likely to include the unfavourable aspects of QCs.

It is also unfortunate that only the successful seem to be motivated to describe their experiences openly. Those who have had lesser returns from an investment in quality circles are not likely to pass on to others what they will regard as failure.

Difficulties of measurement

Another reason why firms are reluctant to evaluate QC programmes is they do not have procedures developed in order to do so initially. The introduction of a quality circle programme will involve several different departments: production, personnel, engineering, quality, who have little experience on cooperating on such a project (Rieker, 1979). It is unlikely that a coordinating force will exist to cost all the many different aspects of the programme - from training to building a meetings room - as the QC operating system will not exist.

In addition, many costs will be "hidden" at the outset. It will be impossible to predict how many circles will form (since they are voluntary) and in which departments, especially since the programme must have long planning horizons. The number and identity of participants is not known and as different individuals will have varying costs attached to their time, costs are difficult to calculate in advance. Similarly, since quality circles are free to choose their projects at will, the costs of investigation may vary considerably. Problems may be at low level

and therefore part of departmental costs, but a group in its more mature stages may choose a design problem necessitating the involvement of senior engineers whose time is relatively expensive to the company.

In the same way, benefits will be virtually impossible to predict. QCs will differ in their ability to impact on the output of their work area, or in their freedom to change product specifications or working methods. A group working in an accounts department, for example, has less opportunity to generate cost savings than a production orientated QC, that is it will have no quantifiable indicators like reject rates to work with.

If less direct benefits are anticipated, as in the Mohr and Mohr example quoted above, how can these be measured at all, let alone in advance?

QC philosophy

Another reason for a reluctance to objectively assess the feasibility of a QC programme in a company is that it somehow goes against the basic philosophy of quality circles. Terms like "personal development", "respect for humanity" and "voluntary participation" are often used when discussing QCs (see , for example, JUSE, 1980) and with such a bias, it seems inappropriate to then apply strict accounting principles.

This has led many firms to avoid any assessment of their QC programme, either when making the initial investment decision or when the programme is actually running, to see if it is paying its way (Seed, 1983; Gryna, 1981).

This approach is losing ground to those who advocate integrating the QC programme fully into the management control system (Jones, 1983; Hopkinson, 1981), with the caveat that any assessment must be made with a long-term view (Tate, 1982; Ryan, 1983) so that the less direct benefits can be reaped.

Middle managers

As with senior management, middle managers may have a formal role in the QC organization to fulfill, as a facilitator or steering committee member. This is not the limit of middle management involvement, however; all will be required to give their support to the quality circle programme in order to promote its effective operation. This is a frequently occurring theme in the quality circle literature but there appears to be little discussion about what management support for quality circles is and what forms it takes.

It is possible to classify management support for circles into two broad categories - formal and non-formal (felt) support.

A. Formal support for quality circles

This will take two forms - the provision of facilities to allow the QCs to function, and the evaluation of circle proposals.

Al.1 Provision for QC operation

It is the role of the middle manager to allocate the resources required in order for QCs to function at all, since they have the authority to perform such an allocation. Perhaps the most critical way in which middle managers must provide material support for QCs is in releasing subordinates from their normal duties to attend to circle business.

For production departments, this will usually mean budgeting for the loss of supervision and production operators for the duration of meetings. In specialist functions, managers must authorize subordinates to conduct investigations for circles, or attend meetings as a "guest expert". Specialist functions must also be willing to commit time and materials to building prototypes, conducting trials, searching for information to meet a group's needs, as well as providing the resources needed to put solutions into practice.

Al.2 Evaluation of QC proposals

It is part of the process to hold formal presentations of proposed solutions to management (Robson, 1982a). The members receive training in the presentation techniques commonly used by management and will prepare a case in such a format to put before an audience of those managers who need to be informed, or who will make the decision to implement the proposal. Management are required, of course, to attend the presentation and then to investigate the proposal fully, before authorizing its implementation through normal channels, if found acceptable.

B. Felt support for QCs

Likert (1967) showed how supportive relationships, as part of a general approach to leadership, encourage high performance from subordinates. Likert defines supportive as "contributing to or maintaining (the individual's) sense of personal worth and importance" (ibid, p. 103). A supportive attitude in the quality circle context will most probably take the form of recognizing the achievements of circles and conveying the feeling that their contribution is highly valued by management. This will help build the self-esteem of individual participants, as we can infer that

they attach a high importance to management approval by the fact of their participation, and thus act as a reward for their involvement in the programme. The impact will be to ensure their continued participation, as well as motivating them to higher standards of performance (Katz, 1964).

It is apparent, however, that such support is not always forthcoming from middle managers (see, for example, Cole, 1980b; Bartlett, 1983). It is possible to envisage a number of reasons for such reluctance.

Firstly, it could be the individual manager feels he is unable to free the resources necessary to provide material support for QCs. Since they are fully committed already, a manager in a specialist function may feel that the burden of work on his department is already great, and that there is no capacity available to take on the extra work which circles will bring. He may thus refuse to allow cooperation from his subordinates. This may be especially vital at crisis periods - last minute rushes to meet production or product approval deadlines, during holiday periods and so on, such that support may be withdrawn at these times, even if it is freely given normally.

Similarly, managers may be unwilling to release resources if they feel that short-term objectives are likely to be threatened. A manager may feel that quality circles divert too much attention and effort away from short-run targets, such as output levels, reject rates or cost control. In such an instance, he will consider the meeting of such goals as higher priority than the longer term benefits promised from QCs, even if he believes that these will accrue.

A problem that arises here is that the focus on quantifiable, short-term benefits is an integral part of the Western management philosophy (Pascale and Athos, 1982) and rewards and sanctions are based upon it. To concentrate on uncertain, intangible and long-term objectives at the expense of short-term goals, constitutes a risk which some managers may not be willing to take.

An extension of this idea is that middle managers may simply not believe that QCs will bring about the benefits claimed for them, and so are exercising their right not to "volunteer" to be involved. It seems clear that, since the accepted necessity for full management commitment on the one hand, and the voluntary principle on the other, are contradictory, the latter is sacrificed in favour of the former. Few writers on QCs seem aware of such an inconsistency, but it does not go unnoticed by others.

Another reason why middle managers may fail to support circles is that they feel their position and legitimacy are threatened by the very presence of the quality circles.

Bradley and Hill (1983) note that managerial authority is usually centred on commanding the greater part of the information available in the organization at any one time. Through quality circle activities, workers and supervisors can gain possession of more information than they would normally receive in the course of their work, thus,

"... to the extent that information is synonymous with influence, quality circles may shift influence downwards towards rank and file employees and away from middle management". (Bradley and Hill, 1983, p. 294).

Thus, quality circles may use this information to reveal incompetencies in managerial performance. This seems to be particularly significant for technical managers, whose position in the organization is dependent on his control of a specific specialism and body of knowledge (Pettigrew, 1972; Juran, 1978).

A final reason why managers may not cooperate fully with quality circles will be based on a natural resistance to change, whatever the form it takes within the organization (Burgher, 1979; Kast and Rosenweig, 1974). The introduction of a QC programme will act as a threat to the established system, where organizational members have accepted status and authority; change will bring about uncertainty which most individuals find difficult to cope with.

With so many potential reasons for withdrawing support, it can be seen that unless rewards for support of, or involvement in, a quality circle programme are expected and received, then a fair number of dissenters can be expected. Bradley and Hill (1983) postulate that the approval of superiors will be an incentive, although it may not be sufficient to guarantee enthusiastic acceptance of circles (ibid, p. 295). One US company, Westinghouse Electric, now include support for circles as a criteria when considering candidates for promotion at all hierarchical levels, thus building in a powerful incentive for support (Barra, 1984).

It is impossible to predict how many firms would wish to take such a step, but the number is likely to be small.

Technical Staff

Members of specialist functions will be very much involved in any quality circle programme. They may be required to serve as facilitators; Dale (1983) in surveying UK manufacturing firms

using circles, found that roughly 34% of facilitators come from technical departments (quality control being the major source) and a further 31% from personnel and training departments. Technical staff may also act as consultants to groups, being brought in when required, or may lead or be a member of a shop-floor or engineering quality circle. In this study, 80 QC meetings were observed; at no less than 63 of these meetings a member of a specialist function was present either as facilitator consultant, leader or member. In other words, at only one-fifth of these meetings was the standard formula of supervisor and workers solving their own problems unaided actually being followed. It should be noted, however, that these 80 meetings related to 35 different QCs, 3 of which were engineering circles, but it is still true to say that the involvement of technical staffs was considerable.

The support required of technical staffs is mainly of the formal, material kind (except for facilitators) and is given in two ways, by giving advice and by implementing quality circle solutions.

Advice

Although problems are generated and solved by the QC themselves, there may be some occasions when the circle members do not possess sufficient expertise between them to produce the best answer. They may then call upon specialists to give advice in a specific area (Hutchins, 1981a). The frequency with which this is done will vary according to the circle's work domain and the type of industry it is operating in. In the example quoted above, many products manufactured are relatively complex and involve advanced technical knowledge, so it is not surprising that the involvement

of technically skilled people was high. Even in more basic technologies, QCs might still need help in understanding costing systems to enable them to calculate the precise impact of a proposed charge, for instance. Some writers feel that intervention by specialists in QC activities (that is, too frequent, or that takes the form of permanent membership) is detrimental to the development of individual groups (Hartley, 1981; Lewis and Rooney, 1981) since technical staff will tend to dominate meetings, and restrict members' opportunities to gain more information themselves. In the complicated organizations which modern companies are, it is difficult to imagine how quality circles function without specialist help, unless QCs are orientated towards solving only those problems which lie entirely within their own capabilities, as some would advocate (Hutchins, 1981b).

Implementation of projects

There are two schools of thought on project implementation. According to the first, quality circle solutions, when approved by management, should be implemented by management, with the option of involving circle members where possible (e.g., IPM, 1982; Hutchins, 1981a). The second approach is that the QC is primarily responsible for implementing their own solutions, only seeking outside help if necessary (Collard, 1981a).

It is to be expected that however implementation is carried out, investigations will first be conducted as to the feasibility of the proposed solution by appropriate specialists before any final decision is made by management. If such validation is not sought, then costly mistakes may be made. It may seem obvious that such precautions should be taken, even if in the interests of good

working relationships between departments, but there is evidence to suggest that some managers do not take such steps (Jones, 1983).

The role of technical staffs can be seen as an important contribution to a successful quality circle programme. The status of technical functions stems from their control of various types of information in the organization, so passing such data on to the circles may represent an implied threat to their position (Hartley, 1982). It can be postulated that if care is not taken to involve specialists fully at the beginning of a programme's life, resistance to QCs will be especially marked.

Supervisors

The most usual form of involvement for supervisors will be as circle leaders. They will be recruited as one of the first stages in founding a quality circle programme (Robson, 1982a). Foreman and first line supervisors provide the focal point of circles for many practitioners. In Japan, the quality control circle initially developed out of attempts to educate supervisors in quality control techniques and change workers' attitudes through their influence (JUSE, 1980). Bank and Wilpert (1983) see QCs as a way to re-establish the role of the supervisor in British industry at shop-floor level and halt the separation of his responsibilities from grass roots issues. By encouraging cooperative activities with his subordinates, he is no longer identified with management and his credibility with them is restored (ibid, pp.25-6).

It may be that the supervisor is not directly involved in a QC. In this instance, his support will be required, and the same issues may arise as were discussed in relation to middle managers above.

Workers

This group will be required to support QCs through their active participation in a group and their acceptance of the guidelines of operation set down by management. There will be a proportion of workers who are not members of QCs, so their role in the programme will be restricted to accepting QC proposed changes and offering felt support for those who are members. Non-members of QCs are usually a widely scattered group and there is little evidence to say how they react to QCs, or how their reaction impacts on QC performance. There is a possibility of a separation between participants and non-participants which leads to a deterioration in working relationships (Bradley and Hill, 1983). Dale (1984) studied the reasons why individual circles collapse, but does not pick out opposition from workmates as a possible reason for failure.

2.6.4 Summary

This section has studied the involvement which various individuals can, and do, have in quality circle operation. It is apparent that participation is required at all hierarchical levels, simultaneously; a company-wide commitment is essential, judging by the experience of firms using circles.

2.7 Characteristics of Quality Circle Operation

2.7.1 Problem solving methods

Having considered the way in which QCs are organized and the philosophy behind their existence, it is useful at this juncture to consider the task work quality circles perform and the ways in which decisions are made.

The issue of decision-making in groups has attracted some considerable attention among academics, both from the point of view of decision alternatives available, and from the effect these alternatives have on individuals and groups. MacCrimmon and Taylor (1976) discuss a selection of studies in their paper and demonstrate the variety of work already conducted on the subject. The process by which a quality circle arrives at a decision must therefore be considered crucial to its effectiveness as a group as well as the task output of the quality circle.

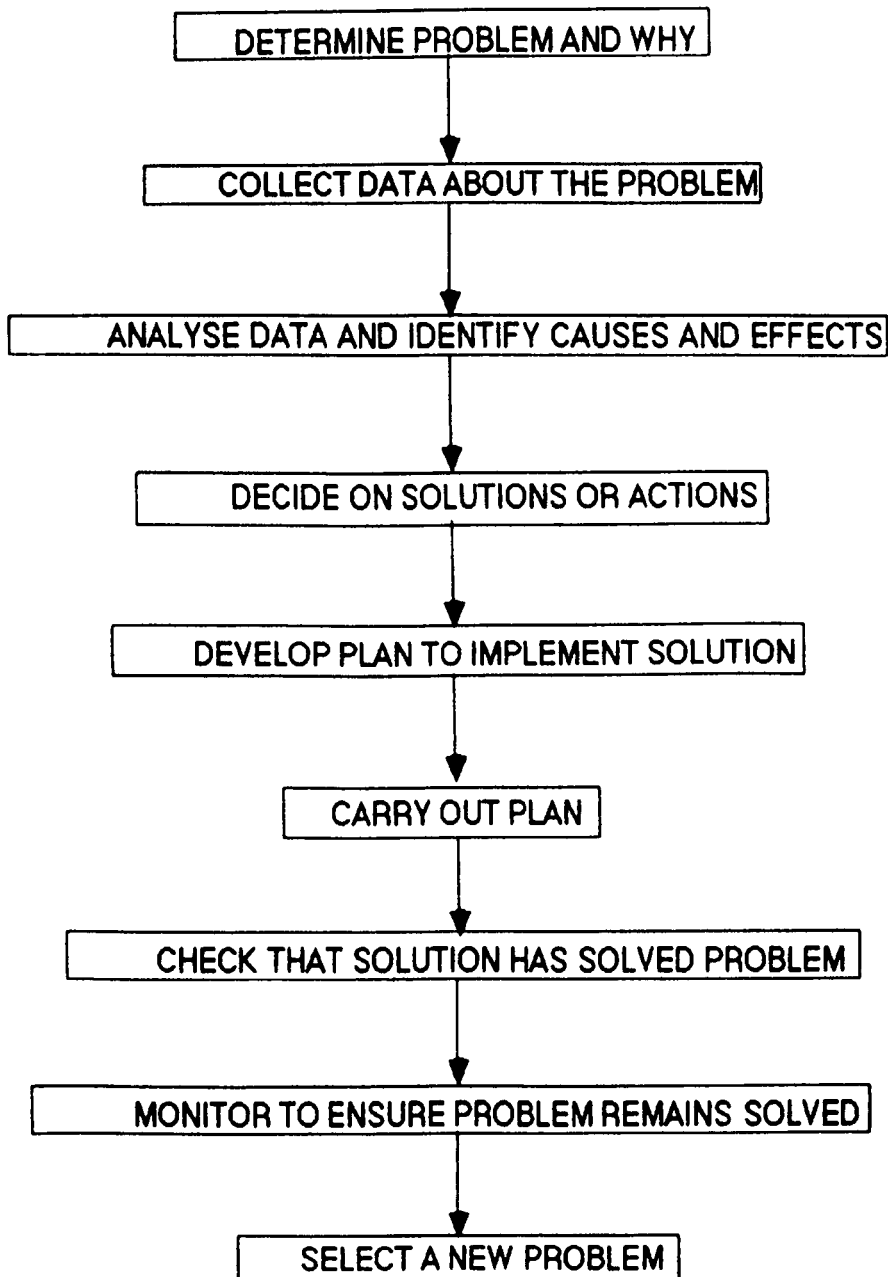
Review of the literature reveals broadly similar approaches to problem-solving. Many articles have been published in management journals by practitioners describing the methods used in their organizations. In order to prevent this discourse from becoming too unwieldy, I propose to present one model of quality circles used in this country by clients of PA Management Consultants (1979), including the company studied in this research project. There are other variations used in various contexts but to describe each one in detail would be repetitive and uninformative. Reference to any of the articles on the subject available (Russell (1983) presents a working bibliography) will reassure that this model is representative, although modifications of detail are to be found (Fukuda, 1981).

The model

Once a quality circle has been established in a work area, and the group members have been established, a training programme will instruct members in the problem solving process. Quality circles follow a nine step problem solving cycle (see Figure 2.2). All groups are encouraged to follow this process for each and every subject they tackle. It assumes strictly sequential task

FIGURE 2.2

THE NINE STEP PROBLEM SOLVING CYCLE



work; by its nature it does not encourage looking at different areas of work simultaneously. For this reason, this nine step cycle could be criticized for its assumptions that work problems occur in isolation and does not make provision for complex interrelations between different events.

The cycle in detail

1. Definition of problem

It is implicit in this quality circle model that groups select their own problems and define them in their own terms. This is one of the founding principles of the concept. Circles are instructed to generate ideas using the idea generation technique of "brainstorming", first developed by Osborn (1957). This is basically a method of producing the largest possible number of ideas around a given subject. It requires strict rules governing the conduct of a "brainstorming" session which are quite specific and may be interpreted as restrictive and directed at quantity of ideas rather than quality (Rikards and Freedman, 1978).

After a number of possible problems have been identified, then the group select the one to which they assign the highest priority and define it quantitatively.

2. Collection of data

The next step is centred on amassing the data set required to develop potential causes of the isolated problem. Instruction is given on the use of check sheets - simple measures to systematically gather data about the problem, usually from their own work area outside the formal meeting.

3. Analyze data....

Data is processed using the most basic statistical formats - Pareto diagrams, histograms and conventional graphs. Examples of these have been constructed in Figures 2.3 and 2.4. Use of these particular arithmetic tools is perhaps somewhat remarkable since they are neither sophisticated enough to give accurate analysis of complex problems nor common and straightforward enough to be immediately recognizable to an averagely numerate shop-floor worker.

.... and identify causes

An alternative, or adjunct, to the tools described above is the cause and effect diagram, often referred to as the "fishbone" (see Figure 2.5). Groups are encouraged to treat their problem as an "effect" and to cluster possible causes, categorizing them broadly as they go on separate "bones" of the diagram. Further analysis will isolate the most likely cause which will lead to the next step in the problem solving cycle. This technique is designed to clarify contributory factors to a problem and aid group members in both drawing inferences from existing data, or suggesting new areas for examination. Such a method assumes static problems, of course, with an easily identifiable sequential cause and effect process. More dynamic and complex situations, with problems constantly varying in scale and feeding back to compound themselves, are difficult to fit into such a rigid model. This raises issues about the suitability of the quality circle for rapidly changing, high technical or process environments (where cause and effect can be very difficult to detect and measure).

FIGURE 2.3

THE PARETO DIAGRAM

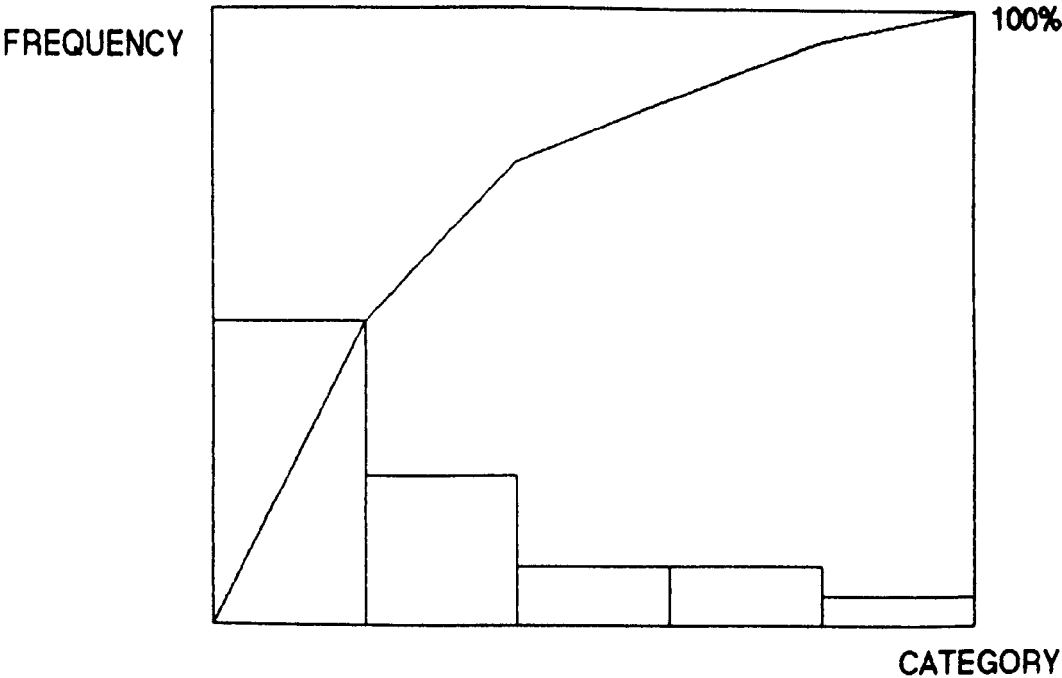


FIGURE 2.4

THE HISTOGRAM

Standard

Standard

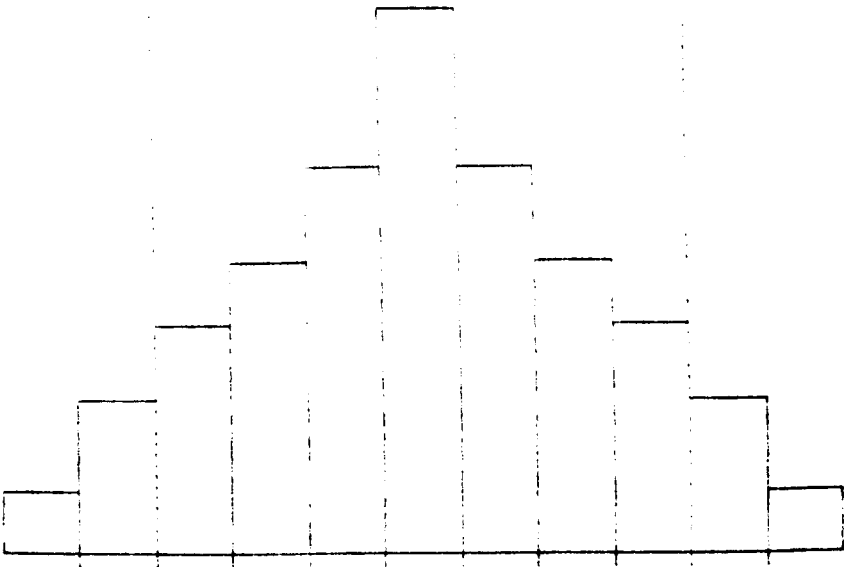
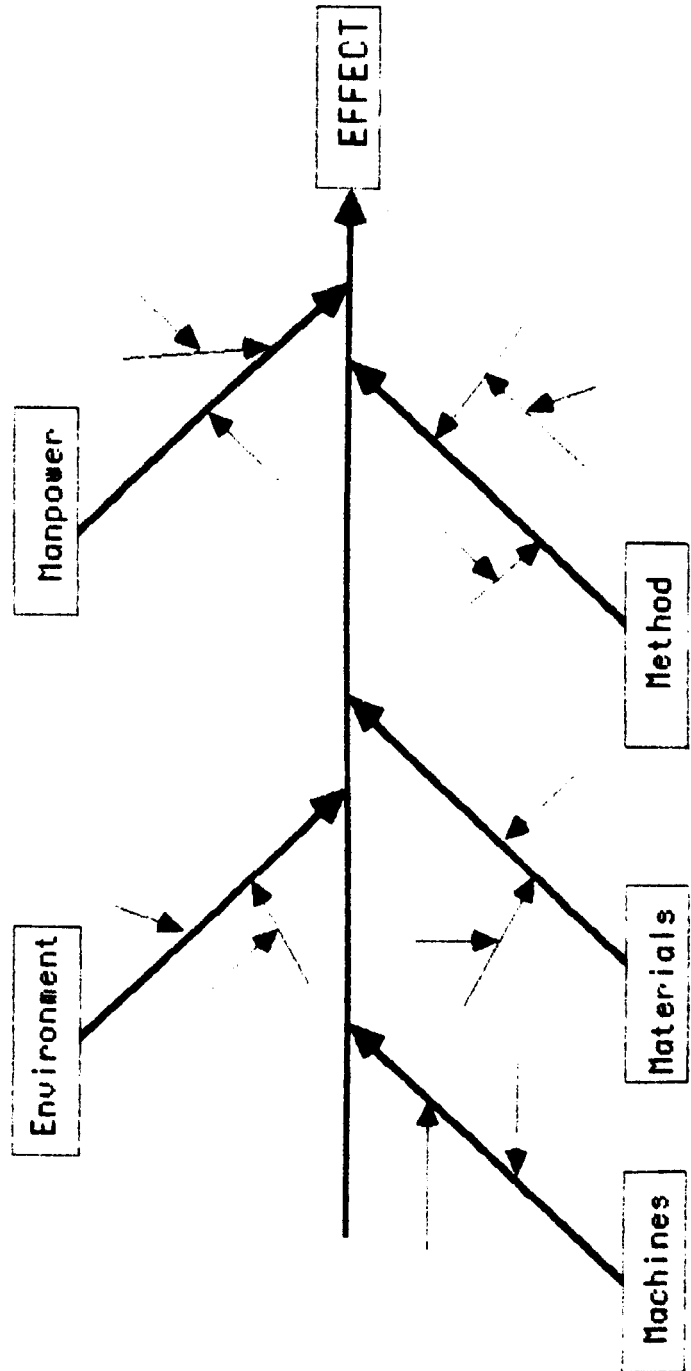


FIGURE 2.5

THE CAUSE AND EFFECT DIAGRAM



4. Decide on solutions or actions

This crucial phase of the problem solving cycle does not have a repertoire of ready-made devices to aid the processes which are available earlier on. Here the QC must rely on the judgement and skill of its members and of those willing to give advice and share expertise. The next step,

5. Develop plan to implement solution is also quite vaguely defined, with little structured guidance available. Experience shows that it is at this stage of the problem solving process that puts the heaviest burden on the most able circle members.

At this stage, quality circles are encouraged to draw up a formal presentation and to "sell" their proposed solution at a gathering of the management team. This is intended to build confidence, to give an air of professionalism to aid credibility with management and to develop self-esteem through the congratulations and willing acceptance from a grateful management. The alternative, a deflation of confidence and esteem resulting from a hostile, or more usually indifferent, management, is neither considered nor prepared for.

6. Carry out plan

Once the management team have given their approval and consent, when and where necessary, the quality circle will put its plan into action. In some cases this will be possible, but in others the quality circle may not have the authority to take action. It is easy to foresee a situation where QC-preferred solutions are passed on to others more expert in the given field to implement. This could perhaps diminish satisfaction in the job for QC members and increase the workload of others with unwanted extra cases.

7. Check that solution has solved problem
8. Monitor to ensure problem remains solved

These can be taken as one item since they involve complementary operations. As with (4) and (5), no specific actions or techniques are available.

9. Select a new problem

Thus the loop is complete and the cycle may be repeated.

A quality circle is trained in such an approach during the initial meetings of the group and will then begin to use it to solve its problems.

The success of this approach can be judged by reference to the findings presented later in this study. It is not proposed to expand this analysis further. There are, of course, other approaches to problem solving. For example, the management oriented approaches suggested by Kepner and Tregoe (1965) or Davis (1972) among others. Such alternatives do not appear to be given much credence in the quality circle philosophy.

2.7.2 Intrinsic motivation

Quality circles operate on the principles of intrinsic job satisfaction. Writers have proposed that there are characteristics of jobs which stimulate a satisfaction with the job which motivates individuals to high performance. Specific job characteristics such as autonomy (Hackman and Oldham, 1976; Morse and Reimer, 1957) social interaction (Katz, 1964; Tannenbaum, 1966), variety and job challenge (Morse, 1953) have become associated with intrinsically satisfying work.

Quality circles can be seen as a device to build in such characteristics into an individual's work without the necessity to fundamentally re-design his job. The fact that quality circles are

small and permanent groups means that individual members are integrated into group relationships and can activate a sense of belonging. The ability to become involved in problem-solving provides variety and challenge in the job.

Rewards for participation in quality circles

As a part of this philosophy of intrinsic motivation, it is often the case that those involved in quality circles receive little or no material reward for their participation (Jones, 1983).

In Japan, however, many circles meet in overtime and are paid at higher rates. Some are rewarded with modest payments for successful suggestions (Cole, 1980). In some industries, there are inter-company competitions between circles and the best quality control circle project will receive a substantial cash prize (JETRO, 1981). Many Japanese companies have active suggestions schemes and quality circle projects are eligible for submission (JUSE, 1980).

In Western countries, on the other hand, the idea of financial reward has been dropped, on the whole.

The conventional wisdom is that, besides the need to promote intrinsic job satisfaction, financial incentives will lead quality circles to modify their problem-solving to cover only those topics which will generate reasonable cash awards (Cole, 1980). There may also be an inherent injustice in the production system in that circles may not have the equal opportunities for finding money-spinning projects. Gorfin (1969) in discussing the conventional suggestions scheme, has pointed out such shortcomings. This writer has also drawn attention to the divisive effects money-orientated suggestions schemes can have, by creating

hostility between those awarded a prize and those not. It can be hypothesized that such animosity could arise equally among individual quality circles as between circle members and non-members.

Adherents of such wisdom stress the importance of intrinsic rewards for participation and of contributing to the long-term effectiveness of the organization (IPM, 1982). This approach has been criticized as an anomaly; such assumptions are based on what Dore (1983) has called a "high trust" organizational form, such that workers identify with company goals and are committed to meet them and where a situation of mutual trust exists between management and the shop-floor. Dore does not believe that many companies who use quality circles in the West conform to this type. The emphasis on intrinsic reward, however, can be viewed as an attempt to move towards such a high trust model from the low trust form, where the employment relation is based on monetary reward (Bradley and Hill, 1983).

Owing to the inappropriate style of organizations in the West, many believe that this tendency to shy away from financial incentives for quality circles cannot last. Jones (1983) comments,

"The simple myth is that in the western industrial setting, mere recognition is not an adequate reward for performance." (ibid, p. 97).

Cole (1980) believes that financial rewards must be offered if quality circles are to be sustained for long; without them there is no clear connection in workers' minds between the quality circles' contribution and overall company performance.

Reservations have also been expressed by trade unionists in the UK. Wardle (1981) believes that the benefits from quality circles should not be "syphoned off" by management, but should be

subject to conventional bargaining procedures, a view mirrored by the cautious reaction of the Trades Union Congress (1981). This may be interpreted as part of a general suspicion that quality circles may threaten the traditional role of the trade union in the work-place by establishing direct links between management and the shop-floor. Bradley and Hill (1983) have also asserted that some firms, particularly in the United States, have used quality circles as an attempt to break union power, so such scepticism from the unions may be justified.

It can be judged from the Jones' quote above that the most usual form of reward in firms who do not use financial means, is recognition from management. This is presumably felt most at a presentation to management of a proposed solution, or in the form of certificates given for successful training programmes, buffets and other social events, or through the normal system of informal rewards in the organization, should such a system exist.

It is clear from reviewing quality circle literature, that all notions of reward are centred on the quality circle leaders and members alone; there is no mention of how, and whether, managers will be rewarded. Barra (1984) implies that reward for managers may be promotion. It can be expected that rewarding managers for their participation in circles will be beset with problems, as it is for the groups themselves.

2.7.3 Autonomy

A further principle incorporated in the design of quality circles concerns the groups' autonomy. Once established, circles operate independently, in the sense that they have freedom to select their own projects, conduct meetings as they wish, design their own solutions, and, in some cases, implement them without

any intervention from management, unless specifically requested by the group (Bank and Wilpert, 1983). Of course, quality circles are management initiated and are given guidelines to work to, the way in which the formula is applied is at the discretion of individual groups (Lewis and Rooney, 1981).

Quality circles as autonomous work groups

It may therefore be appropriate to describe quality circles as a type of autonomous work group. This is an idea developed by socio-technical systems theorists, who attempted to write the social and technological aspects of organization into such a form that alienation in work could be reduced and human potential developed (Emery and Thorsrud, 1976). An autonomous work group can be described as a unit which requires no supervision or control from outside and which does not allocate group members exclusively to the tasks of maintaining or controlling the group (Herbst, 1974).

While a quality circle fits the first part of this definition, in that there are no external controls (other than the aforementioned guidelines), the quality circle leader is concerned with group maintenance and control, even though this is only one part of his extensive role (Mohr and Mohr, 1983). In fact, Gulowsen (1972) has developed seven criteria of autonomy in an attempt to measure the extent to which a work group can be considered autonomous. These are concerned with: goal formulation; the control of operating conditions and methods; the internal distribution of tasks; leadership of the group; the methods used to perform task work. Examination of quality circles in the light

of these criteria reveals that five out of the seven are satisfied. This leads to the conclusion that quality circles are only semi-autonomous by available definitions.

What do these semi-autonomous groups achieve? Herbst (1974) predicts the development of mutual trust and respect and the reduction of wasteful conflict. Emery and Thorsrud (1976) claim that semi-autonomous group working also reduces work stress, permits task rotation (especially of mundane jobs) and greater control over the task. Emery (1972) asserts that a greater individual autonomy will ensue and members will gain the satisfaction of experiencing the completion of a whole task, rather than just the individual components of a task.

There have been countless experiments designed to determine whether semi-autonomous work groups can deliver these potential benefits. Trist and Bamforth (1951), Herbst (1962), and Gulowsen (1972) all report attempts to test the principles of autonomous work groups as a way to improve the situation of the working man. Indeed, the focus of socio-technical theorists has been narrowly set on autonomous groups, and their importance may in fact be overemphasized (Kelly, 1978).

There is no evidence to justify the consideration of the quality circle as a completely autonomous work group. In the absence of any research into this aspect of quality circles, it maybe useful to consider such concepts when evaluating circle operation. It is possible that cooperation between quality circles will develop, as there is some degree of interdependency inherent in their organization. The principle of autonomous groups does provide some insight into the almost paradoxical development of independent quality circles.

Functional autonomy

Gouldner (1971) introduces a further dimension to the concept of autonomy when critically examining Parson's notion of system interdependencies. Gouldner argues that parts of a system are not completely interrelated, but may retain some degree of separateness from the rest of the system. Such separation is part of a need for functional autonomy, where one group is not totally dependent on all others to survive, but retains a degree of independence. Such functional autonomy may rise out of a desire for privacy or to retain confidentiality of information, or a defensive reaction against outside judgement (Gouldner, 1959). Quality circles are encouraged to develop and maintain functional autonomy; they are formed out of a single department in the main (Wood et al., 1983) and are encouraged to restrict their task work to issues which do not impact on other work departments (Mohr and Mohr, 1983). Interdependence between work areas is not stressed in the QC formula. That is not to say that cross department quality circles have not been used (Lewis and Rooney, 1981), but to purists, these attempts to exploit inter-department dependencies go against the quality circle philosophies and will not perform well (Lorenz, 1981b).

Functional autonomy rests on the ability of the group to insulate itself from other parts of the organization and the individual group will develop a strategy to maintain it. This will hinge on the group's success at preserving the boundaries of its activities, a process which Miller and Rice (1967) have called "regulation". This is achieved through monitoring "intra-system"

activities, which forms part of the quality circle process and via the performance of a "boundary control function" which creates a distance between the group and the external environment.

There will be forces, however, which act to diminish functional autonomy (Carnall, 1982) since such autonomy usually means lack of coordination and cooperation which can create organizational strain. Managers will wish to increase the coordination of functionally autonomous groups in order to improve their perception of organizational effectiveness. In the quality circle organization there exist specific roles designed to effect coordination of circle activities, whilst also seeking to conserve their functional autonomy. Thus we have what Carnall has called a "paradox of autonomy".

Other theorists have linked the need for autonomy to other organizational factors. For example, Thompson (1967) predicts that uncertainty in the environment leads to interdependence between organizational members. This means that frequent interaction will be necessary for effective operation, which will be costly to any organization. Thus small groups will form so that interdependence will be localized and these groups will be conditionally autonomous.

Informal autonomy

Katz (1973) sees autonomy as a natural development of organizational life. He defines the concept of "independence from external control" and equates autonomy with informal organization, as identified by Roethlisberger and Dickson (1964). It is possible, therefore, to draw a distinction between directly delegated autonomy, stemming from prescribed procedures and rules, and indirect delegation of autonomy where independence develops

from gaps in organizational role structure. Thus it is possible to differentiate between formally assigned autonomy, as in quality circles, and that which arises out of the discretionary component of the individual's tasks.

Authority

It is important to note at this point that despite being given a degree of autonomy, the quality circle has no functional authority beyond group boundaries, other than that inherent in the organizational roles of group members.

Most often, this will mean that the authority of the quality circle does not extend beyond that of the first line supervisor. If the quality circle needs action over and above that which can be authorized by their most senior group member, then the matter must be referred to management (IRR, 1982). The existence of a formal quality circle organization means that tasks such as the allocation of resources, evaluating performance, sanctioning and rewarding remain with management, and the existing authority structure is unchanged (Wardle, 1981).

It is clear, therefore, that quality circle autonomy does not represent an increase in the power to make decisions in any general sense, as it did in the experiments conducted by Morse and Reimer (1956), for example. Here, autonomy is being used as a way towards increasing job satisfaction - as an intrinsic reward to the individual for his participation - very much in the context it is used in pragmatic theories of motivation (see Chapter 3).

Extent of quality circle autonomy

It is fundamental to the quality circle that its sphere of influence is closely linked with everyday work. Although it functions outside the normal course of work activities (in the sense that a quality circle does not always cover all the people who work in a particular area, and who are still carrying out their normal duties while the quality circle is meeting) the circle concerns itself with issues relating to work at its own level in its own area. There are several reasons behind this.

Firstly it is held that those who actually perform a task from day to day have the most knowledge of the mechanics of that task and problems associated with it. In some ways, they probably know more about their product or process than the engineer who designed the job in the first instance. Unfortunately they would normally have little chance to pass on this knowledge. In many ways, therefore, quality circle members are the most appropriate people to bring out the problems associated with work and suggest how they can best be solved. In this sense, the quality circle is the most efficient way for the company to solve its "grass-roots" problems, whilst encouraging its employees to be more involved in how task work is carried out. Thus quality circles are often referred to in the literature as a way to tap the reservoir of unused talent in the organization, or to fully exploit the human resource. As an extension of this idea, it is thought likely that to stray outside the scope of everyday work is to go beyond the competence of most quality circle members and they are no longer the most suitable people to be tackling that particular problem. Furthermore, to do so would represent an intrusion into another work domain and would be resented.

Quality circles are encouraged to cooperate with other work areas and establish good working relationships with them. By asking a circle not to go beyond their own work area restricts them to problems whose cause and potential solution are within their own control. This prevents them either passing the blame for a problem to another group of people, or unloading the implementation of a solution onto someone else.

The spirit of quality circles is intended to be the spirit of cooperation and team-work. Each work area is responsible for "getting its house in order" and making the maximum contribution to company goals. The emphasis is placed on solving problems and improving performance rather than on discovering inefficiency and apportioning blame.

2.7.4 Voluntarism

Perhaps the most significant distinguishing feature of quality circle programmes is that participation is intended to be voluntary for all. In this respect, it is set apart from other forms of worker participation which involve elected representatives or coopted participants.

It is not suggested that quality circles are the only form of voluntary activity in industry. Trade unions are also voluntary organizations in the terms set out below, and there are other outlets for volunteers such as social committees. What is different about quality circles is that, besides being voluntarily initiated by management, they require the active participation and commitment of a considerable proportion of the organization's members at all hierarchical levels in order to succeed. A typical

quality circle programme may involve 150 to 200 people in a plant with 500 to 600 employees; a trade union in the same factory would need perhaps 15 or 20 active members to work effectively.

It is essential to a discussion of quality circles, therefore, to define the term voluntarism in this context, before ascertaining why it is preferred to compulsory involvement and given such significance (Robson, 1982a).

Towards a definition of voluntarism

Examination of the literature on quality circles to date reveals little serious treatment of voluntarism, and few attempts at a coherent definition. The Japanese Union of Scientists and Engineers (JUSE), organizers of quality circle activity in Japan, stand out in this respect. They define voluntary activities as those carried out by participants from "their own will" and not because they were "told by somebody to do such and such" (JUSE, 1980, p. 31). Mohr and Mohr (1983) associate the voluntary principle with "democracy in action" and see the decision to participate in quality circles as part of an individual's freedom to act, especially with respect to declining to join a quality circle or leaving a group if dissatisfied (ibid, pp.234-5).

Neither definition offers a complete explanation, however, and no others can be found. It is appropriate, therefore, to look elsewhere for interpretations of voluntary activity in the hope that they may lead to a more fitting definition.

The voluntary principle is encountered perhaps most frequently in the social services sector where a whole network of welfare organizations operate on a voluntary basis. The precise meaning of voluntarism in this context, however, depends on whether it is an individual or an organization which is under

consideration. For an organization, "voluntary" means "non-statutory", that is, it does not form part of state provision for social needs. This is in fact analogous to the concept of voluntarism used in theories of collective bargaining, which refers to collective bargaining free from government intervention (Flanders, 1975).

An individual, however, is considered to be a volunteer if he undertakes work that is unpaid (Morris, 1969). In both instances, the response to act is in response to fulfilling a need, or to achieving a desired end (Bourdillon, 1945). Jeffreys (1962), however, defines voluntary activity as that which is initiated by the individual as what Lord Beveridge has called "private action" (ibid, p. 100), and as such does not necessarily have to be unpaid. Such initiative can arise out of the desire for mutual aid, for example in the case of a trade union, or from social conscience.

This idea of personal initiative is echoed by Morris (1955) when considering the role of voluntary organizations in furthering social progress. A desired end cannot be achieved through

".... each man sticking to his own job and working hard at that. It can only be done by his showing initiative and assuming responsibility outside his usual groove. Neither can he do much on his own, for though it is a personal decision which makes a man associate with others, the power lies with people acting together rather than alone." (ibid, pp. 16-17).

It is critical, therefore, that a volunteer who wishes to achieve a specific goal should combine with others in order to do so.

Parsons (1937) has also developed a theory of social structure based on the principle of voluntary action. This has a normative aspect, in that individuals are seeking to obtain norms they feel are desirable. Gouldner (1971) in his detailed critique of Parsons, outlines his definition of voluntarism as

".... a process in which the concrete human plays an active, not merely an adaptive role; far from being automatic, the realization of ultimate values is a matter of active energy, of will of effort". (ibid, p. 192)

In summary, therefore, we arrive at a model of an individual who, acting from his own initiative, chooses to participate in an organisation designed to achieve an objective he considers obtainable as well as desirable, and which is free from external intervention. For this action, he receives no material reward. This can be regarded as a reasonable description of a quality circle participant, where the organization concerned is the quality circle programme.

Yet it may be argued, that since it is established and maintained by a controlling body, that is management, the quality circle itself is not truly voluntary. Despite the fact that it is management initiated and administered, however, the actual work which quality circles do is determined by group members and can thus be seen in essence as a voluntary body in the same way as the Government can establish an organisation which is then run by volunteers and is still considered voluntary (Bourdillon, 1945).

Similarly, Locke and Schweiger (1979) define participative decision making ("PDM") according to whether it is forced or voluntary. Forced PDM is introduced in line with statutory requirements, as in West Germany, where a specified form of industrial democracy is required by law; under partially forced

PDM a contract is agreed to introduce it, but management is compelled to bargain the terms, as in American trade unions; voluntary PDM occurs when management initiate a programme and employees agree to it (ibid, p. 275). What is not clear, is whether employees consent to the existence of the programme, or whether they actually agree to participate on a voluntary basis.

Having established that quality circles fit quite well into established definitions of voluntary activity, it is important to consider why participation is an individual decision, rather than being formally established, as it is in most other similar devices to improve the quality of working life have been (King, 1970), with the possible exception of the Scanlon incentive payment schemes (Lesieur, 1958).

Reasons for establishing a voluntary principle

Attitude change

The first explanation for the desirability of voluntarism in quality circles stems from the assumption that they are introduced in order to bring about a change in attitudes from participants. A company may wish its management to develop a more participative style, its technical staff to be better communicators, or its shop-floor employees to be more cooperative and productive. All these objectives may be achieved by affecting changes in the set of attitudes held by organizational members. This presupposes a correlation between attitudes and behaviour, an assumption which is not without difficulties.

One theory of attitude change which is quoted in the literature on quality circles (Robson, 1982a) is that of cognitive dissonance, first postulated by Festinger (1957). This proposes that, in order to achieve a change, an individual must identify a

disparity between his existing attitudes and an attitude he is being asked to assume. When asked to behave contrary to existing attitudes, he will feign the necessary beliefs if he perceives a potential reward for so doing. This results in an inconsistency or "dissonance" which must be rationalized, either by correcting behaviour, which will not bring the required rewards, or by changing the incompatible attitude. An example would be a manager who is required to support a quality circle programme, but who does not believe in the principles behind it. He will be aware that if he offers his support, he will receive the approval of his superiors and enhance his chances of a successful career with the organization. Thus he will openly support quality circles whilst secretly disapproving of them. It is likely that he will need to exhort subordinates to do the same and so will put forward convincing arguments to them in favour of the quality circle programme. Thus the manager faces cognitive dissonance; he cannot adjust his behaviour, as he will not risk disapproval, but will gradually change his attitudes in line with his behaviour.

If in this instance the individual had been compelled to assume the required behaviour, that is, if support of a quality circle programme were compulsory, then the required change in attitude would not occur, since the inconsistency can be attributed to the very fact of compulsion and the individual is free to hold on to his antipathetic views (Robson, 1982a).

An alternative explanation of why an attitude change will occur in such circumstances is known as advocating a contrary position (Elms, 1967). In the above example, the individual is rewarded for recommending to others a position he is not in agreement with. Experiments have shown that in such an instance,

the individual seeks for arguments in support of the contrary position and eventually succeeds in convincing himself of the myth of his reasoning and so adopts a more favourable attitude (Secord and Backman, 1964). Thus a manager who is required to adopt a public face of support for quality circles, and who must convince his subordinates to support them also, may eventually persuade himself that quality circles are beneficial, merely by the strength of his own arguments. Collins (1969) found that it was the need to convince an audience, along with the social commitment of the individual to that audience, which was the critical factor in attitude change. Following such logic, it is not voluntarism which is required, but compulsion.

The evidence is not conclusive as to which of these arguments is the most valid. Many writers have been critical of dissonance theory (for example, Aronson, 1971) especially since it concentrates on adjustment processes within the individual without taking external influences, like social pressure, into account.

Social behaviour

Another reason for advantage of incorporating voluntarism into quality circles can be discovered by examining the literature on social behaviour and processes. When individuals interact in an organization there exist forces which push them towards uniformity in behaviour (Deutsch and Gerard, 1955). The way in which this occurs is through the establishment of group norms, or standards of behaviour, to which individual members of the group will seek to conform (Sherif, 1936). Those who do not wish to conform will not be accepted into the group (Hollander and Willis, 1967). Homans (1961) postulates that, if faced with alternative reference groups displaying different sets of norms, the individual will

select that group for which he earns the highest "profit" from conformity; in other words, for which the greatest reward is gained with the least cost incurred. One of the rewards which individuals seek when conforming in this way is social approval, so the more approval the individual expect to receive from conformance, the more likely he is to abide by a particular norm (ibid, p. 117-8).

In the case of quality circles, management are seeking to establish new norms of behaviour, or to emphasize or develop existing ones, which they wish the rest of the organization to conform to. By establishing a quality circle programme, they are building groups which seek to achieve high quality of output, high productivity, a responsible attitude to work and which require commitment to organisational goals. The hope is that individual members will join the group, accept such standards and amend their behaviour accordingly. The reward for doing so will be, among other things, the approval of management. In a voluntary programme it is those who seek management's approval most, or who already hold by such standards of behaviour, who will wish to volunteer to participate, and these people will be ready to accept the norms imposed by management (Thibaut and Kelley, 1959). Thus the programme has a better chance of success - there is less likelihood of dissenters being involved who establish an alternative set of norms unfavourable to the project and thereby interfering with its development.

There will inevitably be opposition to any set of norms, but voluntarism will help keep it outside the programme and out of harm's way. In fact, one of the disadvantages of voluntarism is that it means that quality circles attract those who are most

favourably disposed to their principles anyway, and who are probably already, at least partially, committed to management objectives. It is more difficult to reach those who are less susceptible to management influence, and who are therefore less likely to volunteer, whose conversion to quality circle ideals would have the greatest impact.

Similarly, a voluntary quality circle programme attracts as members those who have the strongest achievement motivation, or who derive the most satisfaction from achieving something tangible outside the normal course of their work. These, and other higher order needs (to follow Maslow's taxonomy) are considered an important aspect of work values and many have attempted to detect and measure them in the field (Cook et al., 1981). By involving those with the greatest higher order needs, a quality circle has a better chance of success than if its members were selected for any other reasons.

An economist's explanation

A fresh explanation for voluntarism being associated with quality circles can be drawn out of the recently published work by Liebenstein (1984).

Liebenstein considers the employment relationship in Western firms in comparison with Japan and attempts to predict differences in productivity arising out of it. In Western countries, that is, in all industrialised nations, there exists a strictly contractual relationship between employer and employee in which each party to the contract can make strategic decisions. Management are able to offer different sets of rewards, financial or non-financial, in return for which the employee can offer different degrees of effort. Thus, for each set of rewards offered by management there

will be a commensurate level of effort returned by the work-force, that level being determined by what Liebenstein calls a "convention". For the individual employee, however, there is a "prisoners' dilemma". He has no incentive to break the convention, and put in extra effort for a given set of rewards, since he believes his contribution will be too small to make any impact on group performance and so attract greater rewards, even if he expects greater rewards are on offer. It is unlikely therefore that he will do so, and the convention is not broken.

In Japan, however, the employment relation is based on mutual dependence and a sense of employee duty to meet organizational goals in return for the expectation of certain long term benefits - welfare facilities, lifetime employment and so on (Hirschmeier and Yui, 1981). Thus, high output conventions will be established by the work-force and the individual will invest effort beyond that which is strictly required by his job description, and he expects others to do the same. He knows, in addition, that maximum rewards are gain through collective action.

It follows, that voluntary effort in Japan, where of course quality circles were devised in their present form, is merely a part of the individual maximizing his rewards from employment. In the West the individual has little incentive to do anything which is beyond the convention, which is dictated by the current conditions of employment; extra effort is less likely to be forthcoming.

If Libenstein's logic is followed then it would be anticipated that no volunteers would be forthcoming for quality circle programmes. Since it is clear that they do, there must be individuals in Western firms who are making investment decisions, in the same way as Japanese workers do.

But do quality circles represent "extra effort" in these terms? In the West they usually form part of paid employment rather than in over-time, so it is debatable whether performing a different sort of task for one hour per week constitutes something "extra", at least as far as the members are concerned. For managers and technical staffs in supporting roles, it may apply however. This may often mean working beyond normal hours (unpaid) to fit it into an already full schedule. As their employment falls into the contractual model, so these people must be willing to invest their effort in the hope of future rewards. This calls into question the suitability of Libenstein's theory to explain voluntarism here. It does have a use, however, to provide a contrast on other, more behavioural explanations.

Participative management

A final justification for voluntary exposure can be linked with the principles of participative management. There have been many studies to show that democratic leadership can be more successful than autocratic (Likert, 1961, 1964; Morse and Reimer, 1956; McGregor, 1960). Voluntarism and the freedom to make individual decisions are facets of a participative style of management, so they are consistent with a desire to adopt this specific style for the organization. Furthermore, it can be inferred that those managers who choose to associate with quality circles are thereby showing willingness to develop and practise a

participative technique. If a company wishes, therefore, it can use the quality circle programme to identify those with the desired style of management, perhaps with a view to finding candidates for promotion. This aspect of voluntarism is being used by at least one major company in the United States as part of their management assessment programme (Barra, 1984).

Thus there are a number of potential ways of explaining why voluntarism is of benefit to quality circles. They attempt to give different reasons why a certain type of person will volunteer to support a quality circle programme. The volunteer will: accept the legitimacy of management and seek their approval; be willing to commit himself to organizational goals; be motivated to achieve something beyond that expected from normal work; be willing to adopt or support a participative style of management.

If such people are involved with the programme, it is expected that it will have a good chance of succeeding. It is to be hoped that this success then establishes the quality circle as an attractive reference group for other members of the organization with less favourable attitudes, so that they will eventually embrace quality circle principles, and amend their attitudes and behaviour accordingly. If such a thing does not occur, and the quality circle becomes an elite which is unattractive to others, then an opposition will form and become the more influential reference group.

There is no empirical evidence available to either support or refute this thesis.

The motivation to volunteer

An alternative approach to voluntarism is to attempt to establish why individuals volunteer at all. There is no evidence available in the literature which relates to quality circles. As will become clear, it is not easy to throw light on why people volunteer to join or support a quality circle, the usual reply being "because I was asked" or "I had nothing to lose" and the pressure for continuing once the decision was made is strong.

Once more, due to the lack of available research on quality circles, it is necessary to search for an analogy to throw light on the issue. A close comparison seems to be part-time trade union officials who volunteer to assume these duties in addition to normal work (as distinct from full-time officials, who concentrate exclusively on union business). Moore (1980) found that a sense of responsibility to themselves and to others was a key factor, but dissatisfaction with ineffective shop-floor leadership was also significant. In reviewing studies carried out in this area, Marchington (1980) distinguishes two sets of reasons given for taking up a steward's post - internally or externally directed influences. The former tend to a more positive rationale - a sense of responsibility, ambition or desire for power - than external pressures. These tend to be articulated as "no one else would do it", or "the others wanted me to", and seem to be the most common reasons for standing for the job.

Marchington finds no evidence that those forced into the steward role necessarily continue to take a negative view when they carry out the job.

The distinction between internal motivation and external pressures seems to be a useful way to look at the reasons given for voluntary action. It will be particularly useful when looking at "constrained volunteers" such as leaders and technical helpers.

Empirical evidence

The theoretical explanations for the desirability of the voluntary principle in quality circles, have received such scant attention from theorists and practitioners alike, that there is little guidance as to how important voluntarism is in practice.

JUSE (1980) describe the conditions needed for voluntarism to be given full scope, but produce no direct evidence as to whether it is strictly necessary for a QC programme to function effectively and achieve required results.

One major difficulty voluntarism creates is that it is those who do not volunteer who management will want to influence the most, since it can be predicted that they will have a less positive attitude to the organization in general than volunteers. There is evidence that, in the long-run, the impact of quality circles extends beyond those immediately involved, but it would seem that at least four years of stable circle activity is required before this can begin to happen (see Chapters 6 and 7).

More data is urgently required about the degree of voluntarism of different quality circle programmes, and the relationship between degree of voluntarism and circle performance. Evidence has come from Japan that the voluntary aspect of quality circles has, in fact, disappeared from quality circles altogether, and that quality circle membership and process is becoming institutionalised (Cole, 1982b).

2.8 Uses of the Quality Circle

Introduction

In section 2.6 of this opus, the issue of quality circle evaluation by management was raised. Evidence was discussed which seemed to indicate that managers are reluctant to objectively assess the likely costs and benefits of a quality circle programme in the organization. Some reasons were put forward as to why, in spite of this, the idea is still put into practice.

This section is a brief attempt to probe a little deeper into the motives for introduction, and at the same time constitutes a more general treatment of the plausible uses of a quality circle programme to an organization.

2.8.1 To improve company performance

This is possibly the prime motivation for the introduction of quality circles. It is based on an open systems approach to organizations typified by an attempt to influence the outputs of the system (as measured by performance indicators) by manipulations of the inputs, in this case the human resource and the social system.

The basis rationale is that by concentrating the efforts of the human resource towards the improvement of performance, as measured by one key indicator (quality) then overall performance and competitiveness will be improved (as observed in all other indicators). This is achieved through quality circles in two ways:

1. through the task work successfully completed by QCs, which removes blocks to quality performance in individual departments.

2. through the group effects of QCs - building a more cohesive organization through a network of effectively functioning groups reinforced by supportive and cooperative relationships throughout the organization.

Thus the interaction of social and technical systems are fully utilized to bring about the maximum output from a fixed input.

This concentration of the human resource on quality, is achieved in Japan through a holistic approach to quality control known as Company Wide Quality Control, or "CWQC" as it is commonly termed (Rieker, 1983; Ishikawa, 1979). Quality control circles form a part of this general approach, providing the training for shop-floor workers and supervisors. This corresponds with a high management awareness of quality matters and a production system geared to quality performance, beginning with product design and ending with customer service (Juran, 1979). Thus the whole organization is geared to a common objective, and the operational aspects of production are integrated with the strategic, that is, long-term goals (overall company effectiveness) and short-term objectives (quality performance) are simultaneously achieved (Wheelwright, 1981).

This is part of the Japanese method of organizing production which Clarke and Banks (1983) have described as "resource leadership". A Japanese firm examines the productivity of each of the resources it utilizes and seeks to develop the most efficient use of each in its market sector, thereby becoming the market leader. Thus quality circles are part of developing the optimal utilization of the human resource, achieved through the combination of improved task performance and group effects.

In a speech delivered to the Forum for Corporate Communications, Hajime Karatsu, Managing Director of Matsushita Communication Industrial Company Limited sums up the philosophy, thus

"The elimination of inferior products through innovations in the manufacturing process saves materials, labour and energy, and makes possible the production of an equal volume of products with more value. This process spells lower production costs overall". (Karatsu 1982)

QCs can solve problems which reduce machine down time, improve the utilization and storage of materials, eliminate wastage, or improve the methods used to do a particular job. The collective result of such changes is to improve efficiency as well as achieve the circle's sub-objective of lowering reject rates. It is also predicted that there is a motivational as well as operational effect. By improving knowledge of the job and by developing a sense of individual responsibility for job performance, participants are directed towards achieving organizational objectives (Pabst, 1972; see also Guest and Fachett, 1974 in relation to participation in industry). By establishing good working relationships in the work-place, morale is improved (JUSE, 1980) which also contributes to a better individual performance. This, of course, is based on the presumption that workers' performance is motivated by the expectation of intrinsic rather than extrinsic rewards.

It is also expected that quality circles will improve the range and level of workers' abilities and skills such that they are better able to carry out tasks effectively as well as build good relationships with their fellow workers and communicate effectively (JUSE, 1980).

The impact of QCs on overall performance can be expected to vary with circumstances. Wood et al. (1983) believe that the impact of QCs on performance will depend on the technological environment in which they are introduced. In relatively simple assembly line production systems, for example, the impact which a group of operators can have on the productivity of their department may be comparatively small, whereas in more skilled occupations, potential for change may be great. Thus they conclude:

"Quality circles offer the greatest potential productivity contributions in situations characterized by underutilization of resources and suboptimal performances". (ibid, p. 47).

Bradley and Hill (1983) quote the experience of one British and one American company with QCs. They found that in both cases, quantifiable financial returns had been gleaned from a quality circle programme totalling £0.25 m and £0.1 m respectively. This they take as evidence that QCs contribute to productive efficiency. Bradley and Hill also present attitude data which they interpret as evidence of employees' wish to make their own personal contributions to improved company performance (in similar terms to those set out above). It is advisable not to attach too much significance to these findings in relation to productive efficiency, since a stated desire, or intention to behave in a certain way does not always result in the actual performance of such a behaviour (Lawler and Porter, 1967).

JETRO (1981) report data gathered at seven Japanese companies who were operating quality circle programmes and discovered that all the firms studied believed, and could back up that belief, with material evidence, that QC activities had contributed to higher levels of productivity (ibid, p. 3).

Goodfellow (1981) comments that out of 29 companies studied, only 8 produced "satisfactory results", although he does not elaborate on what these favourable results were.

Leibenstein (1984) hypothesizes that it is the total Japanese employment system which promotes the greater productive efficiency observed in Japanese firms. If viewed as part of this overall approach, it can be predicted that QCs can be shown to make an individual contribution to overall efficiency.

There is insufficient evidence available to judge whether the use of QCs to influence productive efficiency is justified. There are many anecdotal accounts of firms which have been successful with QCs, but there is not enough objective research published to draw any firm conclusions.

2.8.2 To develop an effective management style

Many writers have tried to show a link between a participative, democratic style of leadership and productivity (Likert, 1967; Morse and Reimer, 1956; among countless others). Quality circles can be regarded as a way of encouraging supervisors to be more open with their subordinates and managers to develop a more participative style through their involvement with quality circles (Ryan, 1983). In this way, a firm is using the participation of its employees in decision-making as a means to an end, that is improving their productivity.

2.8.3 To develop goodwill

Quality is a highly valued objective in the current industrial climate, as can be judged from the wide attention directed toward it at present. It is therefore beneficial for a company to develop a reputation for high quality standards, and the adoption of quality circles may be a good way to develop an appropriate image. With the growing use of vendor appraisal systems in industry (Juran, 1979) a favourable aura may be crucial to securing business.

2.8.4 To ensure overall organizational effectiveness

By encouraging more frequent contact between shop-floor workers, supervisors, managers and technical staffs through the quality circle organization, firms may be able to improve the way in which they operate overall. Communication will increase and improve and cooperation and flexibility are built in to the system, reducing sectionalism and competition between different interest groups in the organization (Mohr and Mohr, 1983). Such benefits may take a long time to accrue, however, and it may be postulated that the initial effect of QCs could turn out to be a deterioration of working relationships (Bradley and Hill, 1983).

2.8.5 To serve as a means of worker participation

In the above discussion, participation is encountered as a means to an end. An alternative way of looking at participation in decision-making is as an end in itself. Thus, by viewing quality circles as autonomous problem solving groups, they can be regarded as a method of introducing a form of direct, or local participation at shop-floor level (IPM, 1982; Guest, 1979b). A more detailed discussion of participation can be found in Chapter 3.

There is evidence that workers in industry perceive very little opportunity to make decisions in the course of their work (Heller et al., 1979) and that some desire exists to increase their participation in decision-making even if to a small extent. An altruistic management may therefore wish to introduce increased opportunities for subordinates to participate in organizational decision - irrespective of other anticipated gains, although it has been shown by Marchington (1980) that management's desire to introduce participation will be less than workers' wish for it. Work done by Clegg et al. (1978) suggested that a more direct form of participation (which quality circles represent) is preferred by management to the indirect methods normally referred to under the umbrella of industrial democracy. Mroczkowski (1984) believes that QCs are proving popular in US firms, as a degree of participation is achieved without the need for drastic change in organizational systems or alteration of the existing power structure.

2.8.6 To improve the quality of working life

The Quality of Working Life (QWL) is distinct from participation in that, although they may have the same ends, the way in which they are to be achieved are quite different. Both concepts seek to humanize the work environment, but the concentration here is more on wider concerns such as the job itself and working conditions than simply on involvement in decision-making. Wilson in his paper "On the Quality of Working Life" states:

"A positive response to work depends on at least four major factors: the work itself; its structure and organization; its supervision and management; and the needs and expectations brought by the workers to their work situation". (Wilson, 1973, p. 12)

QWL is based on the idea that, since a large proportion of an individual's waking hours are spent at the work-place, efforts must be made to ensure that the time spent at work is as rewarding as possible for the individual. Examples of the QWL approach can be found in the work of such writers as Taylor (1980) and Rubenstein (1980).

2.8.7 To create a climate for change

The fact that many Western firms are turning to Japan to learn the secrets of their phenomenal industrial success and are willing to put what they find into practice shows that they recognize the need to change established industrial traditions and to initiate action to effect such change.

In this country, at least, any attempt to amend established practices is likely to meet with resistance (Guest, 1979b). Encouraging workers to be more flexible in their acquisition and use of skills is thought to be a necessary element of adapting to modern technology. Besides being a vehicle for developing new talent, quality circles acclimatize participants to accepting change as part of their everyday working lives. It encourages the initiative to voluntarily acquire new skills (JUSE, 1980, pp. 40-45).

When innovation and change are an integrated part of industrial life, the demands of accelerating technologies and increasing competitive market conditions will be easier to meet.

2.9 Overview

This chapter has attempted to bring together the various, disparate elements which make up the Quality Circle. The origins of the concept have been traced, and the experience of its world-wide use sketched.

The discussion has then turned to the more abstract and has outlined a model of quality circle operation building in the published literature in the field. Finally, the objectives of a quality circle programme have been explored. It is dangerous to proceed too far in this area, since little objective research in such matters is available.

Now it is necessary to try and fit this model into organizational theory, with the aim of expanding this final section and to put the quality circle concept into context.

CHAPTER 3 - THEORETICAL BACKGROUND

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CHAPTER 3

THEORETICAL BACKGROUND

3.1 Introduction

Having discussed the quality circle, it is now proposed to place it in context by examining the literature of organizational theory. The scope of this theory is vast, encompassing economic, sociological, psychological, and socio-technical frames of reference and the concept of the quality circle could easily be viewed from each of these angles. There are few branches of the literature which could not be applied to quality circles in some form.

Having said this, it is impracticable to attempt to review the entire range of organizational theory. Instead, several key areas have been chosen which highlight important aspects of the quality circle. First, a discussion of small group theory, which centres on the significance of the group in any organization and then more narrowly on the importance of group structure. This serves to demonstrate how effective a quality circle could be in an organization, since it is itself a small group. Also included is a brief study of the various theories of leadership, since the quality circle concept relies on a strong and effective leader. After this comes an overview of the theory of participation in decision-making. This section contains a brief resume of the research in this area, together with some of the theoretical concepts which underpin worker participation in industry.

The final section is a treatment of the theory of motivation. As already highlighted in Chapter Two, quality circles are designed to achieve an increased sense of involvement in the job and thereby motivate the work-force to take greater care over the quality of output they produce, as well as to take greater interest in the way their work is done. The desired result is improved productivity. The discussion on motivation attempts to throw light on the forces which govern individual behaviour.

3.2 The Theory of Small Groups

3.2.1 Introduction

Group activity is an all-pervasive element of everyday life, whatever the culture may be. From the home to the work-place, time is dominated by interaction with others, by belonging to kinship, friendship, work and leisure oriented groups, and to developing individual roles within each. Parsons et al. (1951) describe how social interaction develops individual personality and perception, integrates ("socializes") the individual in society, and similarly provides the foundation of social systems. Indeed, such thinking is concordant with the philosophy of modern social psychologists who study interaction in groups and whose work attempts to formulate guidelines for the development and use of group activity.

The importance of group activity in organizational life is intuitively obvious. (Indeed, it could be argued that group activity is simultaneously a cause and effect of organizational behaviour.) It is more difficult, however, to arrive at a definition of a group in organizational terms which would be satisfactory to all the theorists of group activity. Shepherd

(1964) has examined some of the vast array of studies on the subject and has arrived at a set of criteria to define a small group consistent with the majority of writings. These are: some degree of formal existence or identity; a number of members which promotes the most effective group interaction (he settles on four as the ideal number); the presence of a common objective. These seem acceptable, but perhaps an element is missing - that is, a perception by individual members that the group exists. A number of people may be formally designated as a group and may be assigned a common task, but if the individuals are not aware that they have a common objective, or that they are expected to interact with the other members, it is open to question whether the group exists at all (Handy, 1981). Indeed, teachers on "Outward Bound" style courses aimed at developing individual or managerial potential, often focus on this and structure their exercises to show participants how failure to come together as a group inhibits achievement.

This sense of belonging to a group promotes the characteristic of group cohesion, much discussed by the proponents of group dynamics, for example, Cartwright (1968). If this dimension is added to Shepherd's criteria, then it will be an appropriate definition to be used.

3.2.2 Some theories of small groups

A great deal has been written about the group, in many differing contexts. A number of writers on the subject have produced theories about the relevance of groups in their environment, their overall purpose, their design, their meaning to

individual members and so on. These theories have provided the basis for the abundance of research which has been conducted on the group.

These theories can be categorized according to the perspective of their originator; psychology-, systems-, sociology-, economics- and empirically-based. They will be discussed in turn.

Psychology-based theories of group activity

The primary theory in this group is really a set of individual ideas all following the same basic principle, group dynamics. Highly influential in group dynamics is the work of Kurt Lewin (1947, 1951). This introduces the principle that a group has an identity separate in essence from its members. A group will have a set of norms or standards of behaviour, of defined roles and patterns of status and influence. Such theory draws the map of group structure which others have followed (Cartwright and Zander, 1968). An innovative step in group dynamics - using experimentally structured groups to help individuals develop and change as well as to learn about the working of small groups - has been taken from the inspiration of Lewin's work (Cooper, 1981). The "T Group", as this specialized group is known, has been used as a means to bring about overall organizational change (Trist, 1968).

An example of a different kind of small group theory, still formulated from a psychologist's precepts, is that described by Hackman (1976). This concentrates more on how groups impact on the behaviour of individual members and the processes by which this is achieved. Hackman draws on the work of many noteworthy researchers in the field, but as with field theory, it is difficult to imagine how the specifics can be adequately put to the test.

Such theories tend to collect a body of disciples who attempt to prove and develop them by empirical work which is of necessity of a very restricted scope. Each one can go part-way to establishing a theory's respectability, but can never prove conclusive when trying to measure psychological states and processes locked in the mind.

Sociology-based theories of group activity

Theories in this group are derived from the social nature of group interaction. They look not to the individual themselves, but to the way in which they come together and what results from this.

Social comparison theory (Festinger, 1954; Schachter, 1959) explains how groups come to develop ideas and opinions and at the same time provides a pattern for the working of small groups. Consensus is achieved through individuals comparing themselves with others and evaluating themselves at the same time. This idea is clearly analogous to the way in which group norms are established and conformity arrived at and maintained.

A similar theory about the formulation of belief and opinions centres on social influence. Power and influence are commonly discussed aspects of group functioning, and they are concepts which could, at least hypothetically, be measured to some degree. Kelman (1961) isolated three types of social influence, "compliance", "identification" and "internalization". All work to induce conformity among members to group norms, thus determining the outcome of group interaction. Thibaut and Kelley (1959) quote "cases" which support Kelman's principles.

Argyle (1969) draws on numerous sources, but criticizes much of the empirical work on group activity for its artificial and experimental nature. He describes the group from a social

interaction viewpoint which concentrates on work that has been done on "real-life" groups such as the family, friendship- and work-groups. He claims to present different conclusions about groups from the more conventional group dynamics approach which concentrate on interventionist techniques and staged experiments. It is not conclusive if the difference is due to an alternative method of interpretation or whether new concepts have been discovered.

Systems-based theories of group activity

Homans (1950, 1961) presents a multi-discipline approach, backed up by laboratory experiments. Two "systems" of activity within the group are distinguished. The "primary system" is the task area, that is, what the group has to achieve as a specific objective; the secondary system is concerned with interaction of a purely social nature. Argyle (1969) qualifies this by pointing out that for different groups, the relative importance and position of these systems will differ.

Herbst (1974) extends this principle to an entire organizational structure of interdependent work groups. The work activities of a group are its "work domain"; on top of it there is an area of social interaction that is not as well defined. Combined over the organization they produce a socio-technical system. Herbst tends to concentrate on the task aspect rather than the social aspect, but the former is a useful way to classify the task objectives of work groups.

Economics-based theories of group activity

The principle example of this kind of theory is postulated by Thibaut and Kelley (1959). They analyze interaction in a group (or rather in a dyad) in terms of an evaluation of the rewards and

costs of each transaction to each party. Possible outcomes can be predicted which, rather as in the "Prisoners' Dilemma" (Handy, 1981), and these will influence individual outcomes. The authors generalize this dyadic theory to the more complex system of a group and claim that the principles held good. However, it is questionable whether the intricacies of a multi-person interaction can be analyzed in such inherently simple terms.

Homans' (1950,1961) analysis can also be included in this category, particularly his later work. He also presents a transaction approach to interaction, where individuals will tend towards the interaction they find most "rewarding" or which has most "value". There is also a notion of payment for "investment" in group activity in terms of an increased reward. As with the Thibaut and Kelley model, this idea centres really on two-person relations. A larger number of participants makes the scheme seem very complex.

Empirically (measurement)-based theories of group activity

Theories of this type concentrate on observing interaction in actual groups and defining the pattern of interaction they find to arrive at principles of group activity. Bales (1950, 1970) has devised the most authoritative scheme for studying group activity, known as "interaction process analysis". Interaction in any context can be measured by an impartial and non-interventionist observer, and is attributed to both the initiator and receiver of the interaction. To facilitate the process, interaction is assigned to various categories. Patterns can then be profiled and inter-group relationships, roles and status patterns can be discerned.

This approach has the advantage of being tailored to any specific circumstance and is nearer to the real, observable world all can identify with. Bales himself makes this point, and goes one stage further in suggesting that the most accurate way to analyze group behaviour is by computer simulation using empirically determined variables (Bales, 1970).

Other writers have produced similar interaction process analysis schemes (Cooper, 1981) which develop and improve on Bales' original design but still hold true to his basic format. Others have attempted to go further, into three dimensions and into new categories of behaviour (Hare, 1983).

In a similar vein, researchers have focussed on other observable variables of group activity to try and draw general implications; for example, would-be seating patterns in a task group, or distances between standing persons (Sommer, 1967).

A common element of these theories, however, is that theoretical content is sacrificed, to a large extent, in favour of observation techniques.

Much of the preceding discussion has been wide-ranging, but has touched upon only the surface of the available literature of small groups. This has been deliberate. Many of the cited studies have been composed from a radically different direction than this discourse. Having outlined the theories of small groups, it is useful, rather than to go into the volumes of research from many disciplines, to focus now on the work organization and the relevance of small group theory to it.

3.2.3 The small group in the work organization

The emergence of the small group as a key concept of organizational design began with the seminal work done by the followers of the human relations approach to management (Morse and Reimer, 1956; Coch and French, 1948). Such studies showed how decision-making at lower levels in the organizational hierarchy, mainly within work groups, could vastly improve motivation, job satisfaction and productivity. Since that time, the group has been the focus of many more generalist management theorists such as Argyris (1957, 1964). Although the so-called Hawthorne studies which began the "boom" in small group research have been faulted in their research methodology, the importance of such research has not diminished.

Other prominent studies focussing on the group have been conducted by Trist and Bamforth (1951) and Herbst (1962) of the Tavistock Institute of Human Relations. Likert (1961, 1967) derives implications for management styles from his studies of various organizations. He shows that an organization based on effective groups is likely to enjoy greater long-term benefits than one relying solely on formal command and obey relationships.

Many of the studies on group effectiveness have concentrated on particular aspects of group functioning or on specific outcomes. Schutz (1955), for example, concentrates on the warmth of liking between members as a determinant of behaviour and ultimately of satisfaction with group achievement. Slater (1955) looked at role differentiation in task groups and was able to plot the emergence of distinct roles and types of leadership. Group size has been a popular area of study. Porter and Lawler (1968)

reviewed the literature to that date and found surprising agreement among empirical studies that job satisfaction is related to a small work group.

It is because of the disparate nature of work on small groups within the organization, that it is difficult to discuss "the group" as a whole and retain coherence. It is better therefore to adopt a piecemeal approach and focus on important aspects of group activity in turn. This cannot be an exhaustive treatise as space will not permit, rather a selection of the more relevant to this study. The order of the following is in no way a comment upon their relevant importance.

3.2.3.1 Cohesiveness

It has already been mentioned that a sense of belonging to a group is of great significance. Cohesiveness refers to the force which binds a group together and ensures that individuals wish to remain in the group and participate fully. Cartwright (1968) discusses a scheme for conceptualizing group cohesiveness as part of a process. He shows "consequences of group cohesiveness" which are a mixture of rewards for both the group as a whole as well as for individual members. Secord and Backman (1964) present a slightly different view. They see cohesiveness as based on attraction - to social interaction within the group, to the tasks the group will perform or to the possibility of achieving personal goals via group membership. They take Cartwright's analysis further to show how a potential group member may assess a number of different outcomes - of belonging to several different groups for example - and choose that with the highest "reward-cost outcome".

An important point raised in the Cartwright paper is that an effective measure of cohesiveness is not easy to achieve. Concepts such as "liking" and "attraction" are virtually impossible to define satisfactorily, let alone measure. This has obvious implications for research design.

Much of the above discussion has skirted around one of the most interesting aspects of groups - role differentiation, or more specifically, the leadership role.

3.2.3.2 Leadership

Introduction

In reviewing the literature on leadership it appears there are too main approaches to be discerned. The first is a generalist one; it views leadership as part of the management process, and discussion of leadership forms part of many a work on management style (see, for example, Mintzberg (1980) or Hunt (1981)). Leadership is one of the repertoire of talents necessary for the successful manager, and attention is focussed on defining the source of good leadership and developing ways to establish good practice and breed effective leaders (Adair, 1980, 1983).

The second approach is directed more to the leader as part of a group rather than as a formally designated manager. Such leaders are less likely to have the backing of the organization's hierarchy of authority and so leadership skills are more vital to success - of the group as well as of the individual. Bales and Slater (1955), for example, raise the issue of the impact of leadership on group stability, on "status consensus". This latter approach is evidently most relevant to this treatment of small group study, but it is still useful to spend some time looking at

the more general view. The orthodox theories of leadership are expounded here and must form an indispensable part of the conceptual set needed for the study of groups.

Theories of leadership

Decades of research and theorizing about leadership have led to the development of a set of alternative interpretations of leadership behaviour. These will each be discussed in turn.

The trait theory

This is the simplest theory and is based on the premise that "leaders are born and not made". Leadership is a personal quality and cannot be acquired. An individual who is inherently a leader will always emerge as leader, whatever the situation. This principle seems to underpin most approaches to recruitment for management jobs at point-of-entry level. Much is made of the need to demonstrate "potential" for leadership even though a prospective candidate may not have the experience of work to prove themselves. Psychological tests or screening by personnel specialists endeavour to seek out the elusive "leadership" quality, as many an undergraduate who has undergone the "recruitment experience" can testify.

This idea is an attractive one. If the essential leadership characteristics could be isolated, then measures may be devised to detect their presence and provide an invaluable selection tool at any time when a leader is needed. Alternatively, a rating system could be devised to assess the effectiveness of those in leadership roles and aid their self-development. To such ends, a wide variety of traits have been tested and there is some empirical verification for a number of them (Stogdill, 1948).

Yet it does not seem that such a theory can hold good; it appears to be a gross oversimplification. Vroom (1976) reviews the empirical work on trait theories of leadership and concludes that there is little agreement among researchers as to the essential leadership quality; each study seems to arrive at different answers, although there are some traits which reappear, such as higher than average intelligence, and a tendency to be extrovert and self-confident.

The situational theory

If trait theories cannot provide a complete explanation, there is a possibility that it is the situation which produces the leader it requires. This is an extension of the trait idea, but sees the emergence of a leader as a result of the combination of the appropriate personality type and the prevailing situation. In this approach, the organization will also have its own unique "personality" as elements are combined in different ways to form complex structures. (For an example of this kind of study of organizational climate, see Burns and Stalker, (1961), Pugh et al., (1969).)

This approach can be combined with trait theories so that not only can individuals with leadership potential be picked out, it can also be predicted, whether any one will be successful in a particular organization (Bavelas, 1960).

A more complex presentation of an essentially situational approach is given by Argyris (1964) who combines the idea of an effective leadership style with the prevailing organizational climate. No one style of leadership is effective per se; it must be applied to the correct situation.

Perhaps the major failing in this idea is the complexity of most situations, indeed it is impossible to envisage two which could be identical in every respect. Fiedler and Chemers (1974) summarize some of the characteristics of the "leadership situation" and demonstrate the wide spectrum of elements that must be considered, thus emphasizing the complexity of any situation.

Power theories of leadership

This an off-shoot of the main body of theory; they could be considered as a part of any of the approaches described here. It is useful, however, to set some space aside to consider the role of power and influence in determining leadership emergence, style and behaviour.

Discussions of power in organizations tend to centre on the management's "right to manage" which is embodied in business organizations. Usually referred to as legitimate power (French and Raven 1968), this is the power to manage or lead based on the rights and duties formally attached to the management role by the organization. Although institutionalized, this power does not necessarily lie unchallenged - an alternative view to the traditional right of leadership is increasingly in question, party politics aside (Storey, 1981).

Legitimate power is not in itself sufficient to maintain a leadership position. Using French and Raven's scheme, it must be reinforced by control of resources, the authority to dole out rewards and sanctions, control of informational resources and expertise (usually through possession of a specialist skill) and, finally, through personal qualities - "personal power" or "charisma".

A less conventional outlook on the sources of power is presented by Pfeffer (1981). He emphasizes the strength of dependence of one party on another as the main origin of power, rather than the skill of one in exerting power over the other. His power sources are analogous to French and Raven's but from a slightly different perspective: power from providing resources, coping with uncertainty, being irreplaceable and through affecting the decision process. These are fairly self-explanatory, and represent a new interpretation rather than a completely fresh scheme.

Etzioni (1965) incorporates the notion of power into his concept of "dual leadership". He produces a two-dimensional model showing a matrix of four leader types. The variables he considers are personal and positional power. An individual may have positional power implicit in his organizational role, but may not be graced with the personal power to accompany it. Such an individual would be termed an "official" rather than a "leader". This particular study is interesting because it combines a model of small group interaction with organizational concepts such as power.

Of course possession of power does not equate to leadership. The leader uses power to exert influence over his followers. Handy (1981) contains a workman-like summary of influence processes based mainly on the work on attitude change. The adjunct of influence to power source makes a more complete view of leadership based on power.

The difficulty which this approach throws up is of empirical verification. The problems in explicitly defining concepts and thus arriving at accurate ways of measuring power are

incalculable. It is also a controversial area, as terms such as "power" and "force" have emotive connotations of excess. Pfeffer (1981) points to such reasons as an explanation of why the issue of power in business organizations has received relatively little attention.

Effective leader behaviour theories of leadership

This category encompasses the major part of the accepted wisdom on leadership and relates particularly to management style. Such an approach focusses on the behaviour of a leader as he practises his craft, on the assumption that different types of behaviour can lead to conclusions about the nature of leadership and of incumbent leaders. A step further is to look at the relative effectiveness of differing behaviours and draw conclusions about styles of leadership, with a view to distilling an ideal style.

There are two sets of empirical work, in particular, which have been instrumental in arousing interest in leader behaviour patterns. The first was conducted at Ohio State University and was designed to detect differences in the behaviour of leaders. Stogdill and Coons (1957) have brought together many of the individual contributions of the research programme. One of the main findings was the discovery of two dimensions of leader behaviour which recurred. These were: initiating structure - that is, defining areas of responsibility and activities for self and the group; consideration, which includes providing support and showing a liking for others.

Vroom (1976) is critical of the methodology of these studies, particularly with respect to the measures used in collecting data. A number of others have attempted to use these two dimensions but the results are inconclusive.

The second set of studies to be considered were devised at the Survey Research Center of the University of Michigan. Katz, Macoby and Morse (1950) carried out the initial work, looking at supervisors and clerks in an insurance company. This was followed up by many other studies.

Katz and Kahn (1951) took a different tack by presenting a four-dimensional theory of leadership: differentiation of supervisory role; closeness of supervision; employee orientation; and group relationships.

The results of all this work gained respectability in management circles through publications by Likert (1961, 1967) which have become influential in the field. These studies were responsible for introducing two categories of leadership style; production-centred and employee-centred. The first concentrates mainly on the task in hand, with little attention to the personnel aspects of the job; the second is concerned more with the people involved in the job, with supporting and nurturing them. Another important facet of the Michigan approach is that it shows group achievements to be more substantial than those derived on an individual basis (Likert, 1961).

This two-dimensional synthesis was developed further in Likert's later work (1967) into four distinct management systems which represent a continuum of styles. System 1 is an exploitative-authorative style where decision-making is highly centralized and concentrated at the top of the organizational

hierarchy. Power is similarly concentrated and frequently exercised. At the other extreme, System 4, the participative group system, stresses working in groups, participation in decision-making and supportive supervision. System 4 is Likert's preferred style.

It is difficult to criticize any of the above propositions since they have been incorporated into the orthodoxy of modern management thought. It is noticeable that much of the work discussed so far in this section is quite similar - it is merely defined or expressed in different ways. Bowers and Seashore (1966) manage to integrate all the above theories, plus others not discussed here, into the same typology and found that they all fit remarkably well.

Blake and Mouton (1964) also build on the previous work, with the addition of the propositions of McGregor (1960) which are reviewed in the following discussion of motivation. Blake and Mouton arrange the dimensions of leadership on a grid with nine points defined on each axis, concern for production and concern for people. Thus there is scope for rating leadership effectiveness. The empirical support for Blake and Mouton's thesis is thin (Smith et al., 1982). Reddin (1970) however has developed the grid to include an extra dimension - that of "effectiveness" which can be interpreted as the situation, an attempt to combine effectiveness and situational approaches.

The final theory of leadership to be reviewed is that developed by Fiedler (1967) as a culmination of many years' research. Fiedler's key variable is known as "LPC" or the "Least Preferred Co-worker". This is a measure derived from a questionnaire given to workers in an organization. Each is asked

to imagine the colleague they are least able to work with and then rate him or her on several different scales. The amalgamate score shows how favourably the least preferred co-worker is regarded; all the rating scales are personal attributes. The hypothesis is that a high LPC rating indicates an individual who can distinguish between task and personal effectiveness.

The research which followed was endeavouring to correlate leaders' LPC scores and the performance of their work groups, but it seems that the results are not conclusive. Looking at Fiedler's results there was a good deal of variation between different groups and it does not appear proven that task achievement and high LPC scores are linked. Vroom (1976) has examined much of the validity work which followed Fiedler's contentions, and does not appear convinced either.

An important point is that Fiedler's model, although apparently measuring leader behaviour, appears in fact to be a combination of trait theory and a situational approach. LPC as a measure is bound to be influenced by the personal qualities of the individual providing the score; it is based on subjective interpretation of behaviour. Correspondingly, Fiedler's reaction to his widely varying correlations between LPC and group achievement is to counteract it with the idea that all groups are different.

In later work, Fiedler goes on to show how his Contingency Theory can be used to improve leadership effectiveness (Fiedler and Chemers, 1974). This is indeed a strength, since many of the other studies mentioned tend to the descriptive as opposed to the prescriptive.

Group theories of leadership

This is looking at leadership from a slightly different perspective. Rather than concentrating on the leader as an individual, it is possible to look at a group as a whole, at the roles present which members assume and focussing on the leadership role in particular. From this point of view the leader is primary a function of the group rather than the individual and, in the case of a group meeting on a regular basis, may shift between individual members.

Bales and Slater (1955) looked at decision-making groups in detail and, in particular at the way in which roles become defined through interaction. The measures used were analyses of group interaction (using Bales' interaction process analysis) combined with a questionnaire asking for group members' own perceptions of the interaction and of other members' behaviour. They found that the perceived leader had the highest activity rate in group meetings, but did not have the highest "likeability" rating, that is, the feeling of personal liking expressed about the leader.

Out of this kind of study comes the notion of status consensus; that stability in group process comes from a status pattern becoming established in a group and providing continuity over time. As an adjunct comes the concept of followership. Just as one individual may emerge as group leader, so will other members consent to his leadership and support and entrench his position. Hollander (1969) discusses this aspect of group leadership and followership. In this discourse, Hollander arrives at the conclusion that it is the most task-able in the group who will emerge as leader, provided he conforms to the expectancies of

the members in terms of his social interaction with them. It is consistency in these two areas which will ensure he retains his position.

Given that the authority for leadership may come in fact from group membership rather than from the leader himself, how does the leader ensure the group works to maximum effectiveness and that the quality of work produced is of a correct standard? In other words how can a leader alter his behaviour to ensure optimum performance for the group?

Before any action can be taken by a work group, a decision must be reached. In some circumstances it will be appropriate for the leader to take decisions; in others it will be more apt for a group decision to be reached. The leader will be in the position to control which type of decision is made, in each specific set of circumstances.

Vroom and Yetton (1973) have developed a model of leadership which incorporates decision rules aiding the leader to regulate his behaviour in this respect. They arrive at eight rules which can be applied to any problem or situation and by process of elimination the appropriate course of action can be selected. Central to the process is choosing between making the decision oneself or sharing a problem with the group and helping them to arrive at a solution to which the entire group can agree, that is, help them to reach consensus (the quality circle model).

The issue of decision-making in groups is a complex one. A paper by Green and Taber (1980), for example, demonstrates the depth to which studies have tried to probe the decision making process, and in this case, with ludicrous results. This is an

issue in itself and a lengthy one; space, unfortunately, does not permit an extensive treatment of this subject. Decision-making in quality circles, however, is discussed in Chapter Two.

3.2.4 Summary

This section has provided an outline of the various ways in which the small group can be viewed in an organizational setting, looking especially at the group in work organization. Many different theories have been quoted, some which appear to hold more validity than others. It is apparent from the disparate nature of the evidence, much of which is based on artificial laboratory experiments, that specific outcomes are difficult to predict, based on the theory presented here.

It does seem, however, that the amassed evidence points to the small group as an effective tool in organizational design.

3.3 Participation

3.3.1 Introduction

This section represents a summary of the literature on worker participation in industry, focussing particularly on aspects relating to a study of quality circles. Its inclusion stems from the assertion commonly to be found that the quality circle represents a means of introducing participation to the work-force, since membership permits individuals to take decisions about their work which may formerly have been management's preserve. It is also seen as a way to enhance a sense of involvement and satisfaction in everyday work. The Industrial Participation Society (IPA), an organization committed to fostering the expansion of participation in British industry, includes quality circles as part of its suggested action plan for the introduction

and promotion of employee involvement and participation (IPA, 1983). This would seem to demonstrate that it recognizes the quality circle as a participative force.

The question as to whether quality circles are in fact correctly attributed as a method of introducing participation is not at issue here. What follows is a selective analysis of the concepts of participation and research in the field.

3.3.2 Concepts and definitions

Many writers when discussing participation begin with the assertion that they are responding to an interest developed over the past few years. Studies based on UK experience, for example, tend to take the Bullock Committee of 1977 or the EEC Fifth Directive as starting points (Guest, 1979a). Participation, or various forms of it, has been enjoying spasms of popularity from as far back as the mid-nineteenth century in this country.

This pedigree is seldom mentioned, and the opportunities to use the past as a guide for the future is often missed (Ramsay, 1977). It is fair to say, however, that as fashions in organizational theories come and go amongst managers, participation has come to the fore again in recent years, and this can be readily appreciated by a scan of the journals aimed at practitioners.

It is important to note at the outset that work on participation is composed from diverse viewpoints; scrutiny reveals that participation is interpreted in different ways by different theorists, depending on their own political and sociological ideologies, the industrial structure they refer to (and their perception of it) and on the academic discipline(s) in which they are skilled. Strauss and Rosentein (1970) for example,

are critical of European approaches to industrial democracy, yet are obviously sympathetic to the socialist notions on which they believe this European approach to be based.

Having noted these possible failings, it is now the intention to look at the ways in which participation can be conceptualized, first in general terms.

It is possible to draw up a definition of participation in the broadest terms. Globerson (1970) for example, defines the concept thus:

".... a participative situation exists where employees are involved in the life of the enterprise above and beyond their direct job duties..." (ibid, p. 252).

This description is sufficiently broad to encompass many different forms of activity; Globerson mentions a company suggestions scheme, for example, as a way of participating. It is perhaps advisable to retain a wide-ranging outlook so as to include in participation such schemes which for many organizations have become part of everyday working life. This avoids the tendency for some to focus on special programmes (like quality circles, for example) rather than to examine ways in which participation can be integrated into the organizational structure.

Globerson's definition, however, is unspecific about the level at which participation occurs. Again, many assume participation to be restricted to those at the bottom of the hierarchy, since it is they who have least involvement in decision-making. Under Globerson's framework, it is also possible to consider the involvement of middle-managers in top-level decision-making for example. Given the context of this study,

though, it is perhaps best to look for a narrower meaning for participation. Walker (1975) confines participation to the lowest organizational level, viz:

"worker's participation in management occurs when those at the bottom of an enterprise hierarchy take part in the authority and managerial functions of the enterprise." (ibid, p. 436).

This definition locates participation on the shop-floor and is more specific about the areas in which participation occurs. Walker combines the notions of taking part in the classical managerial functions (planning, organizing, motivating, controlling) and of exerting influence at higher levels in the hierarchy, thus developing the authority to control their own work.

Walker's approach continues to discuss how the amount of participation in an enterprise will depend on the scope, degree and extent of participation available to the work-place. It is also notable in that it does not exclude those areas in which workers participate, such as industrial action or restriction of output, which are contrary to the interests of management and therefore usually excluded from notions of participation. Correspondingly, Wall and Lischeron (1977) emphasize the plurality and complexity of participation by conceptualizing it as a composition of three elements: influence, interaction and information-sharing. It is expressed thus,

"... 'participation' refers to influence in decision-making exerted through a process of interaction between workers and managers and based upon information-sharing." (ibid, p. 38)

The scope of participation in this definition is restricted by organizational boundaries; it cannot take account of a decision made by independent authorities impacting on the organization and

thus constraining its decisions - a government agency is a prime example. This would also seem to be true of other definitions of participation.

Another aspect of participation that must be considered is the power dimension. A classic pluralist's view of the organization is of a fixed amount of power distributed in an organization hierarchy determining the authority and control resting at each level. Manipulations of the network of control can redistribute the power between the different interest groups, although sociological and cultural aspects must be involved to make the manipulation effective. Such thinking is drawn from the theories of sociologists such as Marx and Durkheim who viewed the industrial power struggle as an extension of the struggle endemic in capitalist society (Brannen, 1983). Lammers (1967) argues, however, following Tannenbaum (1966), that such a "zero-sum game" is not appropriate to a theory of participation in modern industry; it should rather be viewed as part of a dynamic model, since the amount of power vested in an organization is not static. It can increase as rights and responsibilities are changed. In this way, worker participation raises the amount of power they hold whilst not in any way diminishing the amount of power available to management.

In the same vein, Blumberg (1968) has developed a power-based theory of participation, which is represented as a continuum. This definition of participation is as the:

"... entire spectrum of workers' power, from its most rudimentary form (receiving information from management) down to its opposite, complete worker determination." (ibid, p. 71)

Participation is seen as a way to develop independence and control of behaviour in a work-force who have traditionally been dependent on employers and managers to take decisions and to control. It is a way to move from "passivity" to "activity" thereby reducing the consequences of dependence and passivity -alienation.

Not all share the view that the issues of class struggle, power distribution and alienation are relevant to a study of participation, however. Strauss and Rosenstein (1970) believe that such philosophies have no such place. They contend that more towards industrial democracy in Europe have been motivated by ideology, and the American way of regarding participation as a style of management, as by Likert, McGregor and the like, is preferable. Indeed, such unitarist philosophy is detectable behind the research conducted by such writers, although Lammers (1968) disagrees on this point, seeing them as pluralists.

It seems that there are indeed two movements or schools of thought involved. Some, Europeans in the main, have tended to concentrate on the relationship between industrial relations, collective bargaining and participation and moves towards participation have been mainly by introducing worker directors, works councils and other representative forms of participation (especially in Yugoslavia, West Germany and France). In the United States, and to a lesser degree elsewhere, the tendency has been to concentrate on management options such as "Theory Y" (McGregor, 1960), "Style 4" (Likert, 1961, 1967), autonomous work groups (Morse and Reimer, 1956) or leadership styles (Baumgartel, 1956).

Whilst both approaches have their values it does seem an oversimplification when conceptualizing participation to ignore issues such as the distribution of power in society and within the organization (and the link between the two).

Ramsay (1980) is quite vehement in his assertion that such issues must be considered in any theory of participation and that practitioners must take into account that their interests may not be the same as those of their subordinates. It is difficult to disagree with this view.

Having considered such definitions of participation, it is difficult to select the most appropriate to this context. A problem with a power-based theory is that it is difficult to envisage a way to include a measure of power in any empirical validation of a theory. Due to the inexorable link between the organization and wider society in this respect, it is also impracticable to isolate those variables which relate solely to the organizational context. It is perhaps safer, therefore, to recommend a framework which can be used without directly involving power-based issues such as the one proposed by Wall and Lischeron (1977).

3.3.3 Empirical research

Research on participation falls into two distinct types: those which concentrate on schemes attempting to help the individual employee have more involvement in issues directly affecting their work; and those which look at programmes where elected workers represent their colleagues on committees and at management meetings, contributing to decisions on behalf of the work-force. This distinction has been made by many writers on the subject. Strauss and Rosenstein (1970) name the two types

"immediate" and "distant participation" respectively. Wall and Lischeron (1977) have a more sophisticated method of classification. They distinguish between level and form of participation. "Level" refers to the level of the hierarchy at which participation takes place - local, medium and distant, referring to shop-floor, management and board level, respectively. "Form" of participation indicates the way in which it is achieved either directly (by the individual) or indirectly (through a representative). Globerson (1976) presents a similar taxonomy to this, although his terminology is more complex and not quite so instantly assimilated.

As this is not intended to be a lengthy critique of participation, the latter methodology is rather cumbersome. The typology of participation to be used is Strauss and Rosenstein's immediate and distant (ibid). Research studies will be allocated were possible to these groupings, commencing with the first.

Immediate participation

Work in this area is well known in the study of management and has been influential in developing modern theories. Coch and French (1948) carried out experimental studies which demonstrated that participation by workers could play an important part in bringing about job changes, resulting in greater acceptance of changes, higher productivity and morale. Another influential study by Morse and Reimer (1956) developed autonomous working groups which seemed to give members greater satisfaction in their jobs.

Work by Likert (1961, 1967) at the Survey Research Center of Michigan conducted comparable experiments using differently structured groups with varying levels of autonomy. His results will be discussed elsewhere in this chapter, but it is sufficient

to say that they corroborate the evidence already quoted. As part of the same research team, Katz, Macoby and Morse (1950) and Kahn and Katz (1968) concluded that the style of leadership - whether production-oriented or employee-oriented (participative) was an important determinant of job satisfaction as expressed by their subordinates.

Many other studies have been conducted along similar lines - Warr and Wall (1975) contains a summary, as does Blumberg (1968) - and correspondingly have produced equivalent results. In reviewing the literature, Blumberg has been moved to suggest that:

"There is hardly a study in the entire literature which fails to demonstrate that satisfaction in work is enhanced or that other generally acknowledged beneficial consequences accrue from a genuine increase in workers' decision-making power. Such consistency of findings, I submit, is rare in social research." (ibid, p. 123).

It seems, however, that Blumberg has been carried away by his enthusiasm. Morse (1953) and Petz (1952) have both shown that participative leadership alone is not sufficient to guarantee high productivity and satisfaction. French et al. (1960) attempted to replicate Coch and French's results by using a comparable methodology in a Norwegian setting. They were not successful, but attributed their differences to cultural context. Similarly, the analysis and interpretation of the results of such studies have been criticized on the grounds of oversimplification and of inaccuracies in causal direction (Warr and Wall, 1975) and of poor methodology and the presentation of results (Ramsay, 1976). It certainly remains to be seen whether the existing evidence on participation can be seen to have general relevance. Much of it has been conducted in the United States, where the attitudes of managers and workers are intuitively quite different from

elsewhere. Secondly, highly skilled non-manual workers have tended to form the basis of research. Baumgaute1 (1956), for example, studied medical scientists; Morse and Reimer (1956) studied office workers in an insurance company.

Although not strictly relevant here, a brief resume follows of some of the work done on distant participation.

3.3.4 Distant participation

This area has generated its own body of research. The main form which has been examined is industrial democracy, the idea of electing worker representatives to sit on management committees to give the views of the work-force and to ensure these are taken into account when decisions are made. The majority of the work has been done in Western Europe and mainly takes the form of case study, due to the nature of the subject in focus.

One area which has attracted attention and has inspired a large amount of data gathering is the issue of attitudes to participation, perhaps the ideal starting point for discussion.

To begin at shop-floor level, Heller et al. (1979) as part of their wide-scale study of attitudes to participation, conclude that there is little evidence that workers want industrial democracy, although the desire for immediate participation is stronger. Despite this, there is a wish for distant participation to an extent greater than available now. Ramsay (1976) shows similar results, finding support for immediate participation and works councils but little confidence shown in the idea of worker directors at board level. It is interesting that the strongest responses were to the ideas of profit-sharing and employee shareholding - that is, participation in material terms (in the

latter case participating in losses as well as gains). Marchington (1980) could only detect moderate interest among workers for a form of participation involving works councils.

Brannen et al. (1976), on the other hand, report contrasting experience in their examination of the worker directors at British Steel. They found a high degree of felt control over the job at shop-floor level together with an emphatically stated wish for more control at a distant level.

Work done in a different setting in Norway can provide fruitful comparisons. Holter (1965) found apathy towards participation at a distant level but enthusiasm for participation in day-to-day matters.

It is also informative to look at the attitudes of shop stewards towards participation. It appears that opinion is divided. Marchington (1980) found that shop stewards were more enthusiastic about participation than the rest of the work-force, and, indeed, the TUC have stated support for the idea (TUC, 1974). Dowling et al. (1981) in their study of 25 companies found only indifference towards industrial democracy among stewards, although there was more support for immediate participation. Gregory (1979) summarizes the differing factions in the trade union movement, showing that there are various opinions, largely related to context and to management attitude. In summary, however, it seems that collective bargaining will always be the first priority to trade unionists.

To turn to management attitudes finally, this appears to be a controversial area. Many writers believe that, although managers show a lukewarm interest in participation, as do their subordinates, there is quite a different reason behind it. Heller

et al. (1979) found little discernible variance between attitudes towards participation held by workers or managers. Brannen, who has conducted several studies in this area, concurs (ibid, 1983). Brannen et al. (1976) found that, although general attitudes were the same, some differences could be found in the detail. These were based on the meaning of participation for respondents to the writers' surveys, the level of participation desired and the areas where it should take place. Managers were far more likely to be opposed to the idea of worker directors than their subordinates. Overall, though, managers and workers were united in their preference for immediate, job related participation.

It must be borne in mind, of course, that it is management who will introduce participation to the organization. Paradoxically, then, writers have attributed management's lack of interest in participation, not to apathy as for the work-force, but due to their own vested interests. Brannen (1983) goes as far as to say:

"Management are resistant to full participation because they see it as threatening their authority and control. They clearly have a vested interest in maintaining these; but in addition they are firmly of the view that economic efficiency demands hierarchy and authority." (ibid, p. 151).

Why, then, has participation been introduced in so many organizations? Child (1969) contends that the growth of "participative management" is a recognition that this is now the most efficient way to manage labour, given the changes in social structure in the post-war period. Child shows that industrial democracy and participation are a way to give subordinates a sense of power and control with the overall aim of increasing motivation and output.

This is obviously a contentious issue and will not be pursued here. Attitudes to industrial democracy have been discussed at length since there are parallels to be drawn with immediate, direct participation. The success and validity of distant participation is quite another matter which will not be discussed save to mention that the efficacy of such schemes, at least within the bounds of current practice, is open to question (Emery and Thorsrud, 1969).

3.3.5 Summary

Quality circles have been put forward as a way to introduce or increase participation in an organization. Various definitions of participation have been examined, with particular attention to the pluralist approach to organizations and the role which power can play in a theory of participation. Research on immediate and distant participation have been discussed, without comment on their relative merits.

3.4 Motivation

3.4.1 Introduction

One of the principle aims of the quality circle movement is to increase shop-floor productivity by creating a greater interest and sense of involvement in work. In other words, by introducing quality circles, management are attempting to better motivate their subordinates to produce an improved product, process or service quality.

In order to fully explain how, and whether, quality circles actually achieve this motivating effect, it is useful to consider the theoretical basis of motivation at work. Much of the theory in this area is couched from a psychological standpoint - for

example, the work of Maslow (1943, 1970), Alderfer (1973), Adams (1963, 1965) - and tends to be exceedingly complex in parts. It is possible, however, to group the literature of motivation into four basic categories or models of motivation - content theories, process theories, reinforcement theories and integrative theories (Szilagyi and Wallace, 1980). It is intended to discuss the first two of these, leading on to develop an integrative model; reinforcement theory is more concerned with the psychology of learning, and its organizational applications are uncertain as yet.

3.4.2 Content models of motivation

This group encompasses some of the longest standing and best known approaches to motivation. They attempt to postulate which factors drive individuals to behave in a particular way and accordingly they concentrate on such things as needs (Maslow, 1943, 1954, 1970), desire for job satisfaction (Herzberg, 1959, 1966) or money (Taylor, 1947) which are variously identified as motivational forces.

One of the earliest theories of motivation was developed by Taylor (1947) in the earlier part of this century. This adopted a rational and economic view of human motivation to work, being largely controlled by external incentives. Taylor contended that for any task there was a "one best way" of carrying it out which could be accurately determined. Workers then could be coerced into achieving the required levels of output, calculated on the basis of the preferred method. This approach to production systems was extremely influential - he was the originator of work study for example - but as a motivational theorist he offered an incomplete, simplistic view of the individual influenced entirely by financial

reward. Correspondingly, later research findings would contradict his approach (Roethlisberger and Dickson, 1964). Consequently, Taylor's work has been much criticized, and as an explanation of the motivation to work, found to be wanting.

The Human Relations School, based on the experiments of Elton Mayo and his team at Western Electric (Roethlisberger and Dickson, 1964) did much to draw attention to the inadequacies of existing approaches to motivation. The discovery of the celebrated "Hawthorne effect" showed that productivity of workers could increase, simply because they were receiving attention from the experimenters, and this compounded with revised supervisory behaviour. Although much criticized on account of questionable methodology and field practice (Landsberger, 1958), the Hawthorne studies along with the subsequent research they inspired, did show that human behaviour in the work-place was a function of factors other than financial rewards or work methods (Locke, 1976).

Of course, the so-called Hawthorne studies could not disprove the importance of financial incentives and pay in determining performance. Opsahl and Dunnette (1966) review a substantial body of evidence which reveals the enormous impact that pay has on productivity.

The publication of Maslow's work in the 1940s represented a major advance as the first serious contribution from a psychologist in what had previously been the preserve of more generalist organizational theorists. It provided a widened scope to the theories of motivation (Warr and Wall, 1975).

Maslow (1943, 1954) proposed that an individual has five categories of needs which he will strive to fulfill: psychological needs for food, shelter, air, water; safety needs for protection

from danger and economic security; social needs for a sense of belonging, the opportunity to give and receive affection; esteem needs for achievement and the respect of others; self-actualization needs, defined as "the desire to become more and more what one is, to become everything that one is capable of becoming" (Maslow, 1954, pp. 91-92). Self-actualization has also been discussed by Argyris (1964) in a similar way.

The essence of Maslow's work is that these five categories of needs are ranged in a hierarchy, based on what Maslow has called "prepotency". The hierarchy begins with basic physiological and safety needs at the bottom, and is crowned with self-actualization, actually following the order set out above. An individual will be motivated by the most prepotent needs which are unfulfilled and will not precede up the hierarchy until this category is satisfied. Thus, an individual who is starving will be motivated entirely by the necessity of food, and the needs for safety, love and the rest, will not influence his behaviour.

Maslow's theory was intended to have general application, but has been found by some to be particularly relevant to the organizational context, implying that the system used by management to motivate the work-force should reflect the position of these subordinates on Maslow's need hierarchy (Locke, 1976).

Maslow's work has been deemed a significant advance in motivation theory and has therefore received a great deal of attention.

Locke (1976) finds many reasons to criticize Maslow's work on theoretical grounds and concludes that, although it has intuitive appeal, Maslow's central hypothesis remains unproven. Porter (1961) developed a need satisfaction questionnaire in order to

measure managers' needs within the Maslow framework. Lawler and Suttle (1972) used this questionnaire and found little support for the need hierarchy. Similarly, Schneider and Alderfer (1972) examined different sets of workers; for nurses they found Maslow's thesis to be not proven, but for bank and insurance employees they found some support for an amended form of the hierarchy (of which more below). Wahba and Birdwell (1976) have undertaken an extensive review of the studies which have tested Maslow's theory and conclude that different individuals may respond to different hierarchies, in fact, and that these may change over time.

The popularity for Maslow's theory is still strong, however, especially among practising managers, probably because of the strong intuitive appeal mentioned by Locke. Theoretical discussions of quality circles for example often include a brief discussion of Maslow's work (Mohr and Mohr, 1983; Robson 1982a).

An equally influential content theory of motivation has been developed by Herzberg (1966) based on research into job satisfaction and dissatisfaction conducted among engineers and accountants who represented a cross-section of Pittsburgh industry which originally set out to test a Maslow-type hypothesis. The outcome was that Herzberg defined determining factors of job satisfaction - achievement, recognition, the work itself, responsibility, advancement - and of job dissatisfaction - company policy and administration, supervision, salary, interpersonal relations and working conditions. The crucial element of his theory is that these factors determining satisfaction with the job are quite distinct, rather than being different points on a single dimension. He termed these "motivators" and "hygiene factors",

relating to satisfaction and dissatisfaction, respectively. In order to motivate effectively, then, management must manipulate two quite separate elements of the organization.

These findings were then expanded to cover the entire "nature of man" (Herzberg, 1966) and a two-factor theory of job satisfaction was developed. In essence, this stated that hygiene factors were related to man's physiological and physical needs - change these and only a loss of discomfort will result and no more. Motivators are concerned with psychological "growth" needs which are life long. If these needs are fulfilled the individual derives satisfaction from attaining growth; if they are frustrated, there is an absence of satisfaction or an indifference to the job but no resulting dissatisfaction.

Herzberg's findings have generated a mass of research attempting to replicate them in other contexts. Locke (1976) in his review of Herzberg's work concludes that it is virtually impossible to find any study which supports the original two-factor theory although Whitsett and Winslow (1967) would disagree. Hinton (1968) could not support the two-factor theory, showing that there was greater inter-correlation between motivators and between hygiene factors than there was coincidence between motivator and hygiene. Wall and Stephenson (1970) found the theory untenable and concluded that it was based on the respondents' need for social desirability and approval, that is, their tendency when questioned about sources of job satisfaction and dissatisfaction, to select answers which they expect will appear favourable. Wall (1973) and Vroom (1964) were convinced that it was an ego-defensive reaction that led to a distinction between the two dimensions; individuals were more likely to

attribute poor performance and dissatisfaction at work to external factors like salary and working conditions and to associate satisfaction with personal achievements and accomplishments.

Herzberg has also been criticized for the way in which he classified results (Locke, 1976). Schneider and Locke (1971) contend that Herzberg has failed to delineate the event which induces an individual to feel satisfied or dissatisfied and the agent which causes the initial event. Accordingly, it may be equally valid to trace degrees of satisfaction and dissatisfaction to whether the worker has had a good or bad day. Dunnette et al. (1967) believe that the two-factor theory to be an oversimplification; certain job dimensions are more important for both satisfaction and dissatisfaction than others. King (1970) recommends clarification and re-evaluation of the two-factor theory, as he is able to distil five different versions out of Herzberg's original work. Out of these five versions, two are held to be valid, one invalid and two are not proven.

This represents only a fraction of the work Herzberg has inspired, although he has few supporters. That is not to say that his work must be totally rejected; it has generated a new approach to the design of work, which takes into account the human element of any job. This has led to theories of job enrichment and enlargement which attempt to build motivators into jobs so they form an integral part of work (Paul and Robertson, 1970).

Further content models of motivation are inspired by Maslow's need hierarchy. The first was developed by McGregor (1960) who combined his experience as a senior administrator with a needs approach to motivation (Schneider and Alderfer, 1973). He claimed that management and administration in the classical mould imply a

set of assumptions about human motivation which he labels "Theory X". Briefly summarized, this means that the average person is basically lazy and will avoid work if possible. Thus he must be coerced and controlled in order to produce the required effort. He will also avoid responsibility and has little ambition. Theory X underpins motivation through financial reward and penalty, and scientific approaches to management.

It is contrasted with Theory Y, which McGregor clearly prefers, although this is not explicit in his work. Theory Y considers work to be as natural as rest, and, as necessary, external control may be supplemented by individual self-direction. An important reward for effort is a sense of achievement and self-actualization, and all individuals are capable and willing to assume responsibility and make a creative contribution to the organization. Theory Y assumptions lead managers to be participative and flexible in style, and will be less concerned with controlling than with coordinating behaviour.

A further point is that these sets of assumptions will be self-fulfilling prophecies. A manager who holds Theory X assumptions will be convinced that management must control and direct subordinates' activities and will tend to be autocratic, monitoring subordinates' performance closely. Motivation and reward follow a "carrot and stick" approach. This will induce behaviour in subordinates which matches expectations - laziness, passivity, resistance to change, thus reinforcing a restrictive management style.

Since such an approach to motivation cannot accommodate man's psychological needs from work, a model is developed which can - Theory Y. By moving towards a more participative style, organizational effectiveness will improve. This contention has been supported by the work of Likert (1961, 1967) and others.

Since it is not based on actual research findings, McGregor's work has received little critical attention. Morse and Lorsch (1960) attempted to verify the intuitive validity of Theories X and Y by interviewing managerial employees in two companies. They discovered situations incompatible with Theory X and Theory Y - managers who had little participation in decision-making, yet were highly motivated and managers who did have access to participation were less motivated to work. Morse and Lorsch then go on to develop a modified "contingency theory" which stresses the need for achieving a sense of competence at work, which can be fulfilled if there is a fit between individual, task and organization. If they are critical of McGregor, it is because he has not taken account of the complexities arising out of variability in task and in people. Porter and Roberts (1976) have similarly found fault with McGregor for failing to recognize the importance of communication in achieving a Theory Y type of organization.

Ouchi (1981) goes a step further than McGregor and outlines a "Theory Z". This takes up the ideas of commitment and trust implicit in Theory Y and proposes that they form the central thrust of organizational design, as they do in Japan. Unfortunately, Ouchi does not fully acknowledge his debt to McGregor and does not offer any support for his theory save for anonymous case histories.

The next content model of motivation to be considered is the so-called "ERG" theory devised by Alderfer (1973). Schneider and Alderfer (1973) had attempted to test Maslow's need hierarchy, but failed to find support for it. Their main criticism centred around a poor conceptual framework and a failure to link the theory to the organizational setting. This led Alderfer (1973) to condense the original five category hierarchy down to three - existence, relatedness and growth.

"Existence" encompasses Maslow's physiological and safety needs; "relatedness" is comparable to part of safety needs, social and esteem categories and is concerned with interpersonal relationships. "Growth" needs are related to creative and personal growth derived from work and are synonymous with self-actualization and esteem needs.

This represents a hierarchy and is based on three fundamental concepts - need satisfaction, desire strength and need frustration. The outcome is that, as well as being able to progress up the hierarchy as low level needs are fulfilled, an individual may develop a stronger desire for a low level need if a higher one is frustrated. Thus, as well as moving in both directions through the hierarchy, an individual may be motivated by more than one category of needs at any one time (Szilagyi and Wallace, 1980).

Wanous and Zwany (1977) support ERG theory. They contend that it is individual need fulfillment that is critical to motivation (an internal process) such that concentration on changing the organizational climate to suit employee's need is inappropriate (an external process).

It is possible, however, to criticize this approach, as it overlooks the crucial importance of the external forces in determining individual's perception of his environment and how he behaves in it (Lewin, 1947). Salanick and Pfeffer (1977) argue that ERG models are incompletely defined and considered, although Alderfer (1977) has reacted in defence of his theory.

An individual motive which has been much explored by psychologists is the need for achievement. Murray (1938) developed a theory of motivation that viewed an individual as subject to thirteen different needs, including achievement affiliation and power. These have been taken up and explored, notably by McClelland (1961) who has concentrated particularly on the need for achievement (called "n-Achievement" or "n-Ach") which is manifested as a desire to do better, to excel, or to accomplish more.

McClelland and his associates (1953) set out to develop a method of measuring n-Ach, noting particularly that actual achievement was not a safe measure of achievement motivation, since it will be a manifestation of many other things, particularly individual ability. They developed a scoring system based on the nature of fantasies reported by experimental subjects in response to carefully selected stimuli. It was thus possible to distinguish individuals with a high n-Achievement and those with low n-Achievement. Similar work was carried out by French (1955) and Atkinson (1958). McClelland (1961) expects those with strong achievement motivation to seek out situations where they could derive satisfaction from meeting internally devised standards. They would not rely so heavily on extrinsic motivators, such as money, in order to perform well.

Other comparable work has followed. Morgan (1964) linked actual achievement with the need to achieve by studying self-employed businessmen; individuals with high n-Ach enjoyed higher incomes than those with lower scores. In a similar vein, Wainer and Rubin (1969) linked the performance and growth of small firms with the n-Ach scores of their founders.

McClelland speculates that those with high n-Ach will actively seek out situations where they have a good chance of deriving achievement satisfaction. The coincidence of many high achievers in a society at a given time will set a norm of high performance standards which will be pursued in their own right, rather than for the financial or other tangible rewards they may bring.

What is not exactly clear, however, is the process by which an individual develops this motive for achievement. It seems it is possible to define the characteristics of a high n-Ach person, but why he develops this need, and whether it is sustained if high standards of achievement are not possible, is not sufficiently explicit. In other words, the dynamics of achievement motivation are not easily discernible.

3.4.3 Process models of motivation

Process models attempt to identify the factors which motivate people to work, as well as outlining the way in which these influences work to produce a favourable attitude to work. A major theory in this area has been developed by Vroom (1964) and is known as expectancy theory. Many other expectancy theories have been developed, but since it was the first to come to light, attention will be directed at Vroom's work.

Vroom builds a cognitive model, based on work done by Lewin (1938), Atkinson (1958), Tolman (1959) and others. He defines three key concepts: valence, instrumentality and expectancy, which has led to the theory being known as "VIE" theory. Valence is an individual's "affective orientation" towards a particular outcome, or set of outcomes and may be positive, neutral or negative depending on whether an individual prefers to attain an outcome, is indifferent, or prefers not to attain it. Instrumentality refers to the fact that outcomes are not desired for their own sake, but for the associated rewards, and the concept of expectancy refers to an individual's belief that an act will result in a desired outcome. Thus there is a clear distinction between instrumentality and expectancy. Instrumentality refers to the subjective probability that performance will lead to reward; expectancy is the objectively measured probability of an action leading to performance (Vroom, 1964, p. 18).

Vroom explains how these concepts combine to give the individual choices. Motivation ("force") will be a product of valence, instrumentality and expectancy, and the individual will select from among alternative acts that which yields the strongest positive (or weakest negative) force.

Thus this model can accommodate individual differences in a way which content theories cannot, and emphasizes the impact of the environment on the individual.

Peters (1977) strongly supports such cognitive models of motivation, and modifies expectancy theory by defining three linkages. The first is between environmental conditions and a

behavioural response, the second between environmental conditions and belief systems, which leads to the third between the belief system and behavioural response.

A similar amendment comes from Porter and Lawler (1968) who expand the model to include environmental conditions such as reward systems, role perceptions, and work satisfaction.

Mitchell (1974) accepts the validity of expectancy models, but finds that analysis has become so complex that basic assumptions are no longer tested. Feldman et al. (1976), on the other hand, cannot support expectancy theories and presents an alternative conclusion that effort will be moderated by expected outcome.

The equity theory of motivation in fact encompasses several independently conceived models of equitable return for effort (Opsahl and Dunnette, 1966). It proposes that an individual will evaluate the effort he must expend in order to achieve a given task in the light of the rewards he received for its successful completion. Rewards are assessed in a relative way. The individual contrasts his own rewards (say, pay) with the investments he has made in himself (say, acquired skills) and then compares his equation with that of other individuals. Any perceived inequality will trigger behaviour, and an adjustment of effort, to restore equilibrium between self and others.

Homan's work on distributive justice (Homans, 1961) was one of the founding theories. In essence, this predicts that individuals who enter into an exchange relationship acting as if they wish this exchange to be on equitable terms. Homans summarizes his proposition thus:

"Fair exchange, or distributive justice in the relations among men, is realized when the profit, or reward less cost, of each man is directly proportional to his investments: such things as age, sex, seniority or acquired skill." (Homans, 1964, p. 264)

Patchen (1961) showed how individuals compared two ratios when determining whether an equitable situation exists with respect to rewards: they compare their current way with that of others and equate this with the ratio they expect in future. This conclusion was substantiated by Patchen's later research (Patchen, 1961). Pritchard (1969) finds that this explanation is valid when describing situations of underpayment, but for overpayment it is incomplete.

The best known equity theory was developed by Adams (1963, 1976). Like Patchen, he uses cognitive dissonance theory (Festinger, 1957) and draws on Homans (1961). Adams states that the individual will compare his own "inputs" and "outcomes" with another (person) in a roughly similar position. Job inputs he delineates to include effort, age, education, job performance and acquired skills; job outcomes are equivalent to rewards, pay, recognition, fringe benefits, promotion, status and achievement.

It is useful to note that equity theory is based on a comparative process, and that equity is considered a relative phenomenon. That is not to say that it is impossible to have equity in absolute terms. Job evaluation, work measurement and piece rate pay systems all attempt to pay individuals according to the content and demands of the task they perform. Different jobs are given scores and assigned grades according to the skills and experience they require and pay is then established according to grade of job rather than the individual characteristics of the person carrying it out. Job evaluation has a long history in

industry and many large firms clearly use it, especially in relation to managerial jobs (Warr and Wall, 1975). It seems curious that it has been by-passed by equity theorists.

Most problems have been found with equity theory with respect to its ability to predict overpayment situations. Opsahl and Dunnette (1966) summarize the vast amount of research in this area and conclude that, although it has made a considerable contribution to motivation theory, equity theory is so complex that much refinement is necessary (a conclusion which echoes Vroom, 1964). Weick (1966) has identified many inadequacies of the equity principle, while Lawler (1968) claims it is no more than an elaboration of expectancy theory.

It seems that the concept of equity in relation to motivation is of questionable value, especially since few theorists can convincingly predict the reaction to inequalities.

The preceding models of motivation present many potential explanations for some elements of task behaviour at work. Campbell and Pritchard (1976) in their exhaustive review of the literature on motivation, find a need for the clarification of concepts and the identification of a wider variety of variables in the motivational equation and a complete description of those already defined. The treatment of motivation in this way is certainly very complex and seems to imply that human beings behave in a predictable and homogeneous way. This is quite evidently not the case.

It is clear then that the motivational theories so far discussed fall into two distinct groups - commonly termed, content theories and process theories. The unifying feature of content theories is that they attempt to predict factors which

will impact on individual behaviour, that is, serve as motivators, and then attempt to prove through empirical research that there is an association or consequential link between a motivator and performance that can be scientifically measured. The work of Herzberg and his colleagues typify this approach (Herzberg et al., 1959). Little attempt is made in content theories to explain the nature of this link between the motivator and the outcome, or how and why it exists.

Conversely, process theories such as the one expounded by Vroom (1964) seeks to redress this imbalance and reveal the process by which a motivator works on the individual. Such a theorist is less interested in the nature of a motivational device than on the forces it sets in motion within the individual to lead him to change his behaviour. In so doing, however, process theories, in their turn, tend to play down the significance of motivators and demotivators and emphasize only the operation of the motivation process. The way seems clear, therefore, to develop a theory which combines the strengths of both content and process theories and give a more complete view of motivation at work.

3.4.4 An integrative model

Accordingly, there is an alternative approach to motivation theory which attempts to bring together the vast amount of literature published in the field into an integrative or pragmatic motivational model.

Theorists look for specific characteristics of the individual or the task and attempt to assess their significance as a motivating force. This has led to the distinction between intrinsic and extrinsic motivational forces which are activated through delivering intrinsic or extrinsic reward.

An example of an integrated model is provided by the work of Hackman and Oldham (1976). This builds on the two-factor theory of job satisfaction (Herzberg et al., 1959, Herzberg, 1966) and the subsequent scholarship on job redesign that has followed. This they combine with activation theory, which described how individuals adapt and react to stimulation (Scott, 1966) and the socio-technical approach to the redesign of work (Herbst, 1962). A model emerges which they summarize thus:

"The model focuses on the interaction among three classes of variables: (a) the psychological states of employees that must be present for internally motivated work behaviour to develop; (b) the characteristics of jobs that can create these psychological states; and (c) the attributes of individuals that determines how positively a person will respond to a complex and challenging job." (Hackman and Oldham, 1976, p. 250).

The "core job dimensions" which they isolate are: skill, variety, task identity and task significance, which stimulate an experienced meaningfulness of the work; autonomy which arouses an experienced responsibility for outcomes of the work; feedback of actual performance which activates a knowledge of the actual results of work activities. Outcomes will include high internal work motivation, high standards of work performance, satisfaction with work and low turnover and absenteeism

A problem with Hackman and Oldham's model is that it tends to concentrate exclusively on work-related issues and ignores the impact of the individual's situation outside work. Psychological states are dependent on many other variables which organizations cannot control - personal relationships, home situation, emotional state and so on, which may greatly influence an individual's behaviour at work.

Many others have related other work attributes to job satisfaction in the same way (Locke, 1976). Morse and Reimer (1957) have identified the ability to make decisions as significant; Morse (1953) has picked out task variety and job challenge; Argyle et al. (1958) consider supervisory methods to be important, a supposition confirmed by Likert (1961, 1967). Social factors may be significant, also. Katz (1964), Tannenbaum (1966) and Moch (1980) assert that interaction at work and integration into the existing network of social relationships will be a motivating influence.

All integrative models tend to focus on intrinsic motivation and felt reward rather than on extrinsic factors, such as pay. Although it can be argued that pay is of minor importance in determining job satisfaction (Morse and Weiss, 1955) to ignore it altogether as a motivation to work seems inadvisable, especially as a great number of studies have shown that money has at least some impact on performance (Opsahl and Dunnette, 1966).

3.4.5 Summary

Thus it seems difficult to find a theory of motivation that covers all relevant aspects. Integrative theories seem to be a promising development, but have only recently advanced and so are relatively untested. As already noted, both content and process theories tend to have associated difficulties, ranging from an over-simplification of concepts and concentration on a restricted range of variables, to a complexity that makes meaningful interpretation problematic.

CHAPTER 4 - HYPOTHESES

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CHAPTER 4

HYPOTHESES

4.1 Introduction

Having outlined the basic strategy for research, reviewed the available literature on quality circles and the organizational theory relevant to the study of quality circles, it is now possible to move on to isolate specific hypotheses to be tested. This chapter demonstrates how the hypotheses are developed and how they have been clustered. Chapter Five goes on to show how those selected for testing in the research programme were actually tested.

4.2 The Development of the Hypotheses

This process began with the selection of the quality circle as an area for study and a review of the literature in the field. An electronics company had been identified as committed to a quality circle programme, and willing to subject themselves to being the focus of a study of quality circles. Certain "broad brush" ideas were discussed at director level, and a mutual interest in an empirical study of quality circle development agreed. These discussions formed the starting point for the development of the hypotheses.

The next step was for the researcher to visit the company and undertake four weeks' paid employment at one of their manufacturing locations. This enabled some preliminary acquaintance with the quality circle organization on an informal

basis and was an ideal opportunity to assimilate the organization, physical lay-out and some of the culture of the company, as well as establishing useful personal contacts.

The next stage was a thorough and searching examination of the relevant literature and selection of the potentially most fruitful areas of study. These were then developed into preliminary hypotheses, together with a list of research aims and subordinate objectives, referred to in Chapter One. These preliminary hypotheses were clustered according to the theoretical concepts they were derived from and couched in quite general terms. The areas covered included: the effect of change, motivation, voluntarism, power, conflict, management, information services, group membership and the effective functioning of groups.

After further contact with the company, mainly consisting of discussions with management and some additional exposure to the quality circle organization, a pilot research scheme was devised, using the research tools to be used in the entire programme - self completed questionnaire, interview and group process observation - and based on the preliminary hypothesis. This is discussed in more detail in the next two chapters.

The results of this survey were analyzed. As well as proving a successful test of research methods, the pilot survey provided the data required to finalize the hypotheses list for the full scheme. This definitive schedule was used for the design of the full programme. The hypotheses are listed in Appendix 3 and this narrative should be read in close conjunction with the list.

4.3 The Hypotheses (see Appendix 3)

The hypotheses have been drawn from two main sources, as discussed above - from theoretical concepts and from observations of quality circles in action within the company. This in turn has led to the development of two kinds of hypothesis; one which has general applicability to quality circles and the other which can be applied only to the specific context of the company studied. From the first type it was hoped to draw broad conclusions about quality circles in action; from the second it was hoped to predict outcomes for the particular scheme studied.

Having said this, the hypotheses can be clustered on two dimensions - one, the subject matter, and the other the method used to test each proposition. As Chapter Five will reveal how the hypotheses were tested, it is proposed for the purpose of this discussion to classify according to subject area.

It is intended to summarize the hypotheses as they fall into each category, in the order they appear in the full list in the Appendix. The bracketed numbers in the text refer to the location in the list.

The list begins with an examination of the personal approach and individual management style of the unit (or factory) manager (IA). The individual manager who has overall control and responsibility for all manufacturing operations within a product group was referred to in the company as the "unit manager", see also Figure 1.1. It is a basic premise that his individual management techniques and style will influence the performance of his unit and, in turn, the quality circles functioning there. Obviously, the impact will be a general one in this case, setting the tone for the development of the circle programme rather than

determining specific outcomes (see Chapter Two). Thus the areas of concern here are approach (to management and to quality circles), communication, commitment and attitude to the circle concept, and an appropriate response to circle activities.

Included also are general premises on the effect of the unit manager on the performance of the unit as a whole. Due to difficulties in defining specific hypotheses and appropriate tests for them, these areas have not been subject to rigorous analysis. The approach has been to conduct an in-depth interview with every unit manager and to use this information qualitatively to assess the context of quality circle performance. A specific hypothesis has been designed to accommodate a change of unit manager, to enable this to be built in to the research programme.

The second cluster to be developed under the general category of organizational climate is the formal organization (IB). This refers to the hierarchy of managers based on line authority, together with the corresponding hierarchy of technical specialists who interact with the line managers in an advisory capacity. Just as the management style and approach to quality circles of the unit manager can be expected to influence quality circle organization, so will these attributes when applied to line and staff managers. In addition, the nature of the relationships between individual managers and across functions can be predicted to determine the atmosphere of the unit, and this will be of influence on the shop-floor. A number of terms are suggested which can be applied to the nature of working relationships between managers. These reflect two dimensions, one of quality

(productive/counter-productive) and one of consistency over time (continuous/episodic). A fifth alternative, of course, is that working relationships do not exist.

Corresponding to, and in some way mirroring, the formal organization, is the informal organization (IC). This will be a network of social relationships which, although often a consequence of a working relationship, will assume an independent existence, continuing apart from everyday work. These could be based on friendship, shared experience or social interaction beyond work. It is to be expected that such relationships will be a pronounced influence on individuals at work and as such will, in turn, affect quality circles. As circles are voluntary, it is possible to suppose that they may become based on informal work groups already present.

Hypotheses relating to unit performance and its repercussions for its work-force is the next subgroup to be considered (ID). Change is an important factor here, beginning with changes in the nature of the task work a work area carries out. It is vital to bear in mind at this juncture that the company concerned is involved in the manufacture of electronic components, part of an industry currently undergoing a major technological upheaval. Change is bound to be an important factor, as production is modified to keep abreast of the most advanced techniques. Other changes can still occur in a work area irrespective of any due to technical considerations; variations in personnel could be an important factor, or alterations to the physical layout of a work area.

One of the most significant ways in which change will affect individuals is that it will alter their attitude to their job and the satisfaction they derive from it. This could subsequently modify the way in which quality circle participants view their involvement. For instance, a work area experiencing cuts in manning levels without a corresponding reduction in task requirements or changes in the technical system to increase productivity, would experience stress, as work rates are sharply increased to meet the shortfall between available manpower and prescribed output. In such a situation, any quality circle could be regarded as a waste of valuable time, or demanding of effort which should be spent elsewhere. Such a feeling is inevitably detrimental to the quality circle in the end.

There will, of course, be a direct impact on circles from a change in task work besides the effect through individual attitudes. Changes in everyday work will restructure the range of potential areas of activity a circle can identify as quality circle task work. A circle of semi-skilled operators producing a technically straightforward product would be out of their depth straightaway if their product were redesigned to technologically advanced specifications.

Levels of performance can also be a determinant of an effective quality circle programme. Successful unit performance could create a certain amount of slack which could be taken up by quality circle activities. Favourable performance encourages a positive atmosphere in the work-place which will promote smoother operation of all aspects of work, including quality circles ("success breeds success").

Success here refers to perceived success, whether by management or the shop-floor. This is even more important in the reverse case. If unit members perceive recent performance as failure, then this will breed further adverse outcomes, whether that failure is real or imagined. Even a relatively successful unit may experience below par performance at some time which may be interpreted as failure despite its favourable position in comparison with others.

An area covered at this point in the list (ID, 8, 9, and 10) is that of cohesion in the work area. A rise or fall in the numbers of personnel in a work domain should accordingly result in an increase or decrease of cohesion amongst those remaining. Cohesion within the quality circle itself is dealt with in a later group of hypotheses (VIIIA).

Both an increase and a reduction in personnel can have the same outcome, and that outcome can either be an increase or decrease in cohesion. This type of force is very difficult to isolate, define and measure over time, particularly in such a study as this with limited resources available. These hypotheses have been included, since much thought was given to the subject; the decision was taken not to over-emphasize them in the subsequent design of the research programme.

To continue the theme of personnel changes, the issue of enforced redundancies must be considered. Significant redundancies allow the two-fold possibility of either a beneficial or harmful impact on quality circles. This is considered in two different ways, firstly from the attitudes provoked by the redundancies among those left behind and secondly, from the simple fact that a loss of personnel may leave a number of staff insufficient to run

an effective programme. Also part of this is the likelihood of groups becoming depleted by existing members being compelled to quit the unit, who may have been instrumental in a circle's development and high-level performance in the past.

The first aspect, that of attitudes of the work-force after a large outflow of personnel due to redundancy, is considered an issue too sensitive and potentially controversial to test here. Feelings in such a situation are likely to be delicate and easily inflamed, resulting in unnecessary stress to subjects and unreliable data for the researcher.

An area which raises similar problems is that of morale (IE). Morale is a very difficult concept to define; for these purposes it is interpreted as concerning the psychological health of the unit members taken as a whole. It is a highly complex phenomenon, made up of many interrelated factors; for example, the feeling of individuals towards work (especially key individuals with high influence), or the attitude displayed by management towards their own tasks and those of their subordinates. It has been included here for completeness, but it is so difficult to define and therefore measure that it was not included in the research design.

The next section on the list in the Appendix, (II) refers to differences. This is to accommodate inter-unit comparison across the factors discussed so far. Variations in any of the above will generate corresponding oscillations in quality circle performance. The same applies for differences between work areas.

The next cluster (III) focuses on the directions in which individual perceptions of quality circles can be predicted to influence the performance of a quality circle programme.

The first two hypotheses here refer to the connection between the individual's formal company role and the quality circle role, to the extent that they are compatible and may, in fact, be complementary. Those that follow concentrate on the fit of the individual job-holder to the job he performs. There are three possibilities in every instance: that an individual does not feel up to his job; that he feels well-fitted; or that he feels he is capable of more than his job demands. Each case presents a spectrum of possible outcomes, each having a slightly different impact on quality circle development and performance. It is important to note, however, that the impact will be two-fold; in this sense, the nature of an individual's interaction with quality circles will not only reflect his fit to his job, but may become an influence in itself, changing the way that person views his everyday work. The hypothesis that quality circle membership changes individuals' perceptions of their job is not an easy one to prove; it requires a good deal of far-reaching longitudinal study. The adjunct to this proposition, that participation in quality circles changes an individual's perception to quality circles is a somewhat easier prospect.

The next cluster of hypotheses to be considered (IIIA5 and 6) concerns the way in which a quality circle programme is integrated into the everyday working life of the company, the alternative proposition being that the circles are run as a special programme, kept apart from the working organization.

A number of possible indicators have been selected. The issue of pecuniary reward for participation has been the subject of some debate (see Chapter Two). The presence of monetary incentive is an indication that management consider participation in circles as an

extra task, beyond that required from the existing contract of employment; an absence of a material reward seems to point to quality circle activity as part of the normal requirements of the job. Motivation to participate will also differ. There will be non-pecuniary benefits to be gained. If members and other participants are motivated by such spin-offs for themselves, then it can be hypothesized that they do not regard the quality circle as an integral part of their job.

Management attitude can also be expected to reveal something about the assimilation of quality circles into organizational culture. A programme which receives management support and guidance as a matter of course is more likely to be fully integrated than one which has a shortage of support and information services. Similarly, resource allocation will tend to be freer in the first case than the second. If a circle is fully institutionalized, then it must be subject to the same performance criteria and control as other forms of work activity. A possible outcome of an isolated programme is that resources are withdrawn from quality circles during lean periods.

Two issues were considered but not pursued in the research programme. One was the relationship between trade unions and quality circle membership, the other the distribution of power in the organization and the effect that the quality circle has upon it. Interesting subjects these, but requiring careful thought and preparation and skillful handling. Since both areas were unlikely to provide conclusive results as part of this study, it was decided not to pursue them, regarding them better placed as the central theme of a more specialized study.

The next area for consideration (IIIB) begins with the concept of voluntarism which has already been shown to be an essential part of the quality circle philosophy. The approach here is multi-faceted. The first proposal is that individuals are true volunteers when they participate in circle activities. The second proposition is that this voluntarism is essential to the effective development and performance of the circles. If in fact those involved do so because they are directed are likely to behave in a manner adverse to high-level performance, since they will not be personally committed to success.

As an extension of this notion, it is possible to postulate a five point scale of commitment to circles, ranging from enthusiasm through neutrality to open hostility. It is not thought prudent to delve into the reasons why any of these attitudes may be held (although other hypotheses may provide a clue). A study of this type is not the appropriate method of attempting to arrive at such conclusions.

Volunteers or not, it is probable that some members will quit a given quality circle at some point in its history (IIIB5). Having accepted this last premise, it is appropriate to try to predict the number who will leave and the alternative outcomes. Similarly, some workers who have the opportunity to join a quality circle will decide not to take it up.

One particular motivation to participate, on the other hand, is likely to be the achievements which have already been observed by an individual, given that a circle is already in operation.

As already pointed out in Chapter Two, it is part of management's role to demonstrate support and an openly positive attitude to quality circles, and this commitment is likely to be an important part of quality circle effectiveness. Such a principle will hold true at all levels in the organization, although support will be expressed in different ways. For a shop-floor worker, the choice is either volunteering to become a member or providing support from outside the group. Supervisors can also help, in two ways: by direct involvement as circle leader or through provision of the necessary environment for the circle to flourish, without offering their own participation. Technical staffs do become members of circles, but can provide support most often through advice and guidance. Management will help with resource allocation and the free provision of approval which is communicated to participants.

Section IV deals with the relationship of a quality circle programme to other management tools. There are really only two possible outcomes to be considered. These will be either complementary or detrimental to the effective operation of quality circles in the same work domain.

Section V homes in on the quality circles themselves and is a schedule of hypotheses about quality circle operation, both prior to and during the research period. The first question under scrutiny is the circle leader who is expected to be a fundamental agent in determining circle success or failure. An extensive list of the various components of the leader's role is presupposed, concerning both the functioning of the circle meetings and provision for groups outside the meeting hour. Aspects of effective group functioning are included here. It is hypothesized

that the circle leader will behave in such a way as to ensure his group interacts effectively, both as task and socio-emotional ('felt') leader. The leader will also ensure that the group operates well as a quality circle, adhering to the prescribed problem-solving techniques and with an appropriate analysis of performance feedback.

The identify of the circle leader is presumed to be the supervisor in the work domain. There are a number of hypotheses designed to accommodate an alternative - that the leader is another person, but from the same work domain as the circle. It is supposed that members, supervisors and management all regard the supervisor as the most appropriate choice of leader, and a variety of hypotheses are built on this supposition. It will become clear from Chapter Six, that such a premise was found unproven; circles were frequently led by individuals who were not the direct supervisor of the work area. The wisdom of this can be judged from the analysis presented later.

To turn to the circle themselves, it is important to look at the task work which they perform and, more particularly, at the methods used to solve problems (VB). The rate of problem-solving it is supposed, will be need to be constant in order to ensure a successful quality circle, as perceived by participants as well as those outside the circle programme. Accordingly, the nature of the problems selected will need to reflect accurately the tasks carried out in work, in terms of both complexity and variability.

The problem solving methods used are specific and well-defined. It is logical, therefore, to presume that this careful design is intended to equip the quality circle with the most appropriate tools to arrive at effective solutions. As such, the

use of these tools in the correct manner can be supposed to promote a successful problem-solving group. Failure to use them correctly, or at the right time, will affect the quality of solutions produced and thus the level of achievement (and the satisfaction derived from it) experienced by the circle. Similarly, inadequate training in these techniques will result in poor quality solutions and low effectiveness.

Selection of problems at the outset can also be expected to be crucial. Unsuitable topics may be chosen, which would limit the chances of a good solution being developed. A number of potential causes are put forward, but there are basically two main aspects. The nature of tasks in the work domain may mean the range of potential projects is limited; alternatively, the circle may not have developed the necessary expertise to make the appropriate selections.

The interaction between quality circle problem-solving and projects carried out by engineering functions generates an interesting hypothesis (VB7). Quality circles may be left to consider only those areas that engineers are not currently concerned with, either because they are allocated low priority or due to the fact that some problems may be regarded as too complex for a worthwhile solution to be found cost effectively. It is worth noting that engineering departments will almost always possess more information about any given situation than the quality circle. Policy for production developments in future, for instance, is unlikely to be available to shop-floor workers. It is possible to imagine a situation where a quality circle selects a problem related to a particular product for which they are able to produce an admirable remedy. It may, however, be planned to

redevelop or phase out this product in future, so the problem, although recognised by engineering, has been allowed to persist for economic reasons. In such circumstances the circle preferred solution is unlikely to be implemented, thus discouraging the group from further effort.

The composition of a quality circle is likely to be significant to levels of performance. It is hypothesized that skilled operators are likely to find quality circle tasks easier since their product - and process - knowledge will be relatively sophisticated. Unskilled operators will possibly have more difficulty since their everyday job does not require the same degree of skill. Correspondingly, a circle of highly skilled workers may have more impact on management than one composed of semi-skilled operatives, especially in a technologically oriented production environment.

Moving on, the list of hypotheses now features the role of the facilitator(s) in a quality circle programme. This is evidently a vital feature of quality circle structure, and the individual carrying out the facilitator's duties can be expected to be instrumental in the performance and development of the circle programme. In a situation where the facilitator role is in fact made up of a network of narrow span facilitators, then it can be anticipated that each individual in that network will play an important part in overall performance. For simplicity, however, the hypotheses in this cluster (VC) refer to an individual wide-span facilitator. It can be assumed that the same premises will apply to a multiple facilitator set-up.

A summary of the main duties of a facilitator is presented in VC2. The effective execution of these duties will be crucial to the continued existence of the programme. With respect to the best individual to perform these tasks, it seems probable that a person outside the direct line of authority in the company or unit is likely to accomplish more for the quality circles than someone whose position depends on successfully meeting production targets and deadlines. It is possible that a line manager will find that quality circle facilitatorship is in conflict with everyday responsibilities, and that a trade-off between the two is often necessary, depending on circumstances. Such an individual will only be able to devote time and energy to quality circles on a spasmodic basis, and continuity will be lost.

A facilitator whose quality circle role and company responsibility are closely integrated could expect more support for quality circle activities, particularly from senior and middle management. Such support is bound to be crucial to quality circle development, and it will also be necessary for the facilitator to receive the backing of other groups in the organization. For groups such as quality circle members and leaders, that support will mainly be socio-emotional or felt; from above it will need to be felt as well as in material terms, particularly with respect to sufficient time available to set aside for circle business.

The resource factor will be one of the significant determinants of the optimal number of groups an individual facilitator can successfully maintain at any one time. It can be hypothesized that there will be a maximum number which any one facilitator can cope with and still retain an efficient and effective management of circle activities, together with his own

work (if that is what is required of him). If the number of circles under his control is excessive, then he will be unable to devote sufficient care and attention to individual groups, with the result that everyone will suffer to some extent.

The final aspect of quality circles in operation which has led to the development of hypotheses is the way in which the quality circle is launched (VD). This initial stage of any quality circle programme is the methods selected to introduce the circle concept to employees, to gauge the reaction and potential enthusiasm for quality circles and to identify areas where individuals are willing to participate. In the company studied, this consisted of a presentation by the facilitator (already selected by senior management) to various groups, the level and content varying according to audience. Supervisors and foremen were involved at the outset (after trade union consultations where appropriate) and those wishing to stand as leaders identified. The best areas to form the spearhead group of circles were selected by management, including the facilitator and the leaders nominated. Then the work-force were approached, one work area at a time, and the circle idea "sold" to them. If enough were prepared to volunteer for membership, then groups were formed from the volunteers.

It can be hypothesized that this process will be instrumental in forming attitudes to quality circles, especially in the beginning, since first impressions will always have a marked impact. These initial attitudes will persist although perhaps in modified form, and will influence the development and performance of circles throughout their continuing existence.

The next major cluster to be considered concerns quality circle development over time (VI). There are two potential ways in which quality circles can develop over time. The first is that the number of circles operating in a work area will spread, and then the number of work areas involved in circle activity will, in turn, multiply. This raises the possibility that circles can extend from their traditional position among shop-floor direct manufacturing personnel into different work domains - for example, technicians, domestic and catering staff, accounts and other administrative departments or data processing.

The alternative development is that individual circles will develop their competence to extend their activities into areas beyond immediate work problems. Possibilities include workshop safety, welfare facilities, work organization (as opposed to content) or communication systems. This latter growth path can be considered comparable to Herbst's analysis of the work domain (ibid, 1974). The groups' attentions can move from the "core" region of work activity through the "maintenance" and "service" region into the extra task region, as outlined above.

Overall, it is possible to draw several different patterns of growth and decay over time. A standard learning curve (Figure 4.1) shows how the adoption rate of quality circle concepts increases over time, the rate of adoption slowing as competence grows. A "marriage path" (Figure 4.2) demonstrates how the quality circle system, beginning as a separate entity, is gradually assimilated into the organisation until it is fully integrated into the executive system.

DEVELOPMENT PATHS FOR QUALITY CIRCLES

FIGURE 4.1

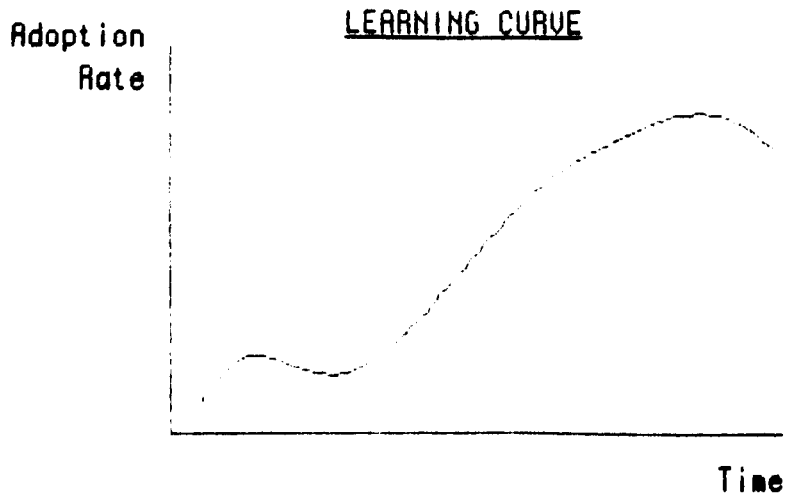
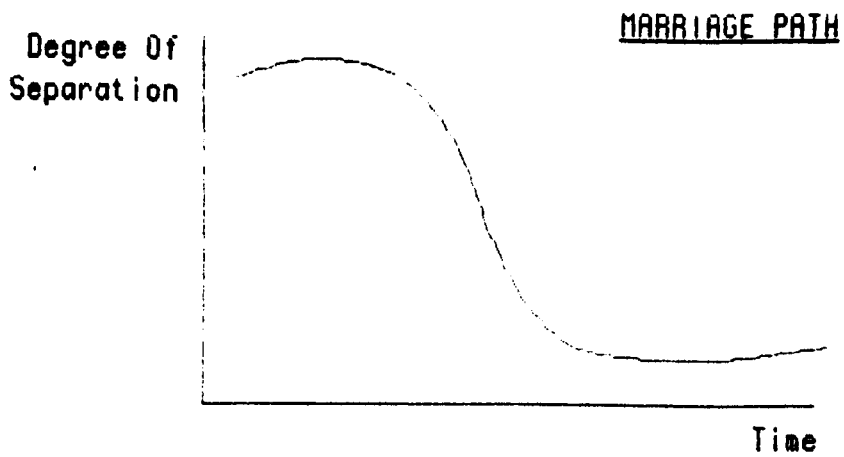


FIGURE 4.2



A "Brahmin" path, on the other hand, predicts that the quality circle will become an elite group, revered for its capabilities and its separation from everyday work activities. An alternative "Roman emperor" path will expect this elite existence to generate hostility followed by a "coup" against the programme followed by extinction.

Such development may arise out of changes in the nature of tasks in the work domain, from increased confidence and better use of skills when quality circle activities are well practised, or from changes in the quality circle process itself. Each of these may work separately to promote quality circle development, or they may work simultaneously to varying degrees.

The next issue to be considered concerns the monitoring of quality circle performance by management (VII). This subject has already been considered in Chapter Two, but whatever the relative merits of assessing performance or not, it is hypothesized that some form of evaluation will take place. The criteria used will be derived from the key results set by management for quality circles, and it is the privilege of the organization concerned to decide exactly what these criteria should be. They will also no doubt be a function of the objectives set by the company for the quality circle programme as a whole.

The perceptions of members of their own performance will also be crucial. They will, in turn, set their own criteria for success and failure and these will be built-in to their individual expectations of outcomes. If expectations are met, then they will be reinforced and participation will continue; if they are not, this is likely to be perceived as failure. Such disenchantment will lead some to withdraw from the circle programme and so the

failure becomes a reality. In the same way, members' attitudes to their circle and its performance may be taken as indicators of their expectations of it (although other factors are bound to play a part).

Having developed hypotheses concerned with quality circle task work and attitudes towards them, it is now appropriate to consider the quality circle as an effective group (VIII). It is postulated that the quality circle is of the appropriate size to develop effective interaction. There must be enough members to generate creativity and stimulate discussion, thus enabling a group identity to be established, along with a structure of group norms and roles. At the same time, the group must be small enough to allow free and equal participation by all members and to prevent the emergence of sub-groups which will threaten the unified identity of the circle.

There is likely to be a size range which will allow effective interaction, rather than only a specific number. Any group whose membership size falls within this range can be expected to function as an effective group. A schedule of criteria are presented here in order to judge whether a group is to be considered as effective. This is based on a number of principles: clear role differentiation together with effective leadership and followership; clearly defined objectives for the group, and with which the members are in sympathy; shared values; heterogeneous membership which accurately reflects the work domain; open and supportive communication and some degree of autonomy for the circle from management control.

If such criteria are met then it can be expected that a degree of cohesiveness will develop within the group (VIIIB). Indicators of cohesiveness are summarized in the list of hypotheses. They include the exchange of information, frequent interaction of the appropriate kind and the presence of the most efficient role structure overall. It is hypothesized that two types of leader will emerge. The process leader ensures the emergence of requisite interaction patterns, and the task-able leader who will lend expertise to the problem in hand. It is probable that the first type of leader will remain static and be personified by the formal circle leader, whereas the second can be expected to shift according to the nature of the task in hand.

A further determinant of quality circle effectiveness will be the availability of information services. This, in turn, will depend on the attitude to quality circles of those who must provide such services (usually individuals in staff functions such as engineering or accounts). The effect could be either to threaten such providers, the quality circle being regarded as a challenge to their professional competence, or to improve the standard of communications between the holders of information and those who seek it. The hypothesis follows that information provided is used in an objective manner, and no constraints are placed on circles to interpret data in a particular way or to reach an orthodox, management-preferred solution.

4.4 Summary and Conclusions

This chapter has served as a narrative describing the hypotheses which have been designed to form the structure of the study. These have been carefully considered and developed through

logical analysis of the material previously presented in Chapter Two (about quality circles) and Chapter Three (about organization theory). As a result, the hypotheses bring together ideas about quality circles in action with predictions of their performance and impact on the organization. It is hoped that the result is a balanced view of the fit of circles to an organization.

For various reasons, not all the hypotheses were put to the test. Some related to areas which might be expected to produce an emotive reaction from individuals, especially if their position were already vulnerable - the impact of redundancies, for example. Others might prove difficult to define and measure in the organization, especially where change is likely to take place. An instance where this has occurred relates to the hypotheses concerning power distribution of the organization. Other hypotheses would have required investigation on such a scale that they demand a study of their own and time and resource constraints, both in terms of the research programme and the production demands of the company under study did not permit this. The study of informal social relationships and friendship patterns outside the quality circle for example would have been very difficult to apportion time to.

CHAPTER 5 - RESEARCH METHODOLOGY

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CHAPTER 5

RESEARCH METHODOLOGY

5.1 Introduction

This chapter is concerned with the research techniques developed and deployed to collect the data necessary to test the hypotheses discussed in Chapter 4. The information required fell into five broad categories.

- 1) Attitudes to work in general and to quality circles.
- 2) Information about the work organization.
- 3) Information about quality circle organization.
- 4) The structure and process of quality circle meetings.
- 5) The task work carried out by quality circles.

There were four basic research methods used to gather this information: an attitude survey; interviews at all levels of the organization; the observation of quality circle meetings; the analysis of quality circle projects. Each of these will be discussed in this chapter in turn. First, however, it is necessary to outline the strategy for research.

5.2 Strategy for Research

At the beginning of the research programme, a schedule of aims and subordinate objectives was drawn up (as discussed in the first chapter). Included in these was the basic approach to research and the methods which were considered as suitable tools to collect the data required to test the hypotheses.

A primary task was to attain information about attitudes towards quality circles and work in general from as large a cross-section of the shop-floor as possible. It is widely held in the literature that the most effective method of collecting attitude data is to conduct in-depth interviews using a carefully designed schedule (see, for example, Stacey (1969), Moser and Kalton (1971) and Hyman et al. (1954)). Since resources were restricted to one researcher, however, the most feasible option was to design some form of questionnaire which was completed by the respondent. This technique has serious limitations with regard to reliability and requires careful design to avoid potential bias, but the alternative was thought too costly, both in terms of research time and production loss for the company.

In order to keep bias to a minimum, however, it was decided to interview a selection of those given a questionnaire to complete. These interviews were structured to serve two purposes - both to provide a test of reliability for the self-administered questionnaire and to generate additional background information of the kind more easily extracted from a face-to-face encounter.

The quality circles themselves were to be subjected to interaction analysis during meetings. It was hoped to gain data from this analysis about role structure in the groups, especially leadership/followership patterns, and to judge whether the quality circles functioned effectively as small groups. The analysis was to be undertaken as a non-participant observer, to ensure that the effect of the researcher's presence on group process was kept to a minimum

The study of groups in action was backed up with discussions with quality circle members during meeting time as a group, as well as on an informal basis with individuals where opportune. This technique had to be applied on an ad hoc basis, the maturity and confidence of the individual groups being a key determinant. It was also desirable to gain access to documentary records of quality circle activities, as well as to attend other meetings, conferences and training courses relevant to the quality circle programme.

These techniques were isolated at the outset. They were refined and then applied during a pilot study conducted at one unit (designated 21) which had a successful and fairly settled quality circle programme (see Appendix 4 for details of the timing of this study). This stable environment meant the full range of techniques could easily be applied and so proved an excellent test of the selected methods.

The pilot survey also provided opportunities to perfect certain individual aspects to ensure the data collected was of the appropriate quality. The success of the pilot from a methodological angle means that some of the data from it can be safely used along with the results gained from the later runs.

The structure of the research programme can be seen from Appendix 4. It consisted of a series of two-week visits to the various units selected for study, interspersed over the three-year period. Run 1 was the pilot survey conducted in the spring of 1982. This was followed in late summer with a further pilot of engineering interview schedules which had been omitted from the

previous run, coupled with preliminary fact-finding visits to each unit. (The selection of the units for the study and their background has been described in Chapter 1.)

The full scheme began in November 1982 and continued until April 1983. This is designated as "Run 2" throughout this thesis. The research tools described in the following discourse were assiduously applied at each unit in turn which demanded a tight on-site schedule.

Having completed Run 2, it became clear that a follow-up would be an invaluable way of measuring attitudes over time, particularly in the unit where two research runs had already been carried out (with some limitations on the usefulness of Run 1, of course). Restricted modifications were made where necessary to the research tools (see Section 5.3) and certain elements added, for example the analysis of "key results" expounded in Chapter 6. Run 3 spanned January 1984 to April the same year. It had been hoped to gain access to the units at precisely the same time of year as in Run 2 so that variation in season or time of year (the influence of Christmas, for example) was eliminated and the runs were as consistent as possible. Unfortunately, entry to the units was not granted for Run 3 until the New Year. It is hoped that the impact of this is minimal, since it transpired that only one unit was in fact affected.

It has been decided, to present all data for individual units and broken down between runs. It was hypothesized that unique circumstances would lead to attitude differences between units, the numerous variables affecting this being included in the hypotheses. Similarly, differences were expected within units over

time. For these reasons, data has always remained separated into its basic components of unit and time to point up such differences.

It is proposed at this juncture to explore in more detail the research tools used, beginning with the questionnaire designed for the attitude survey.

5.3 The Self-completed Questionnaire

This questionnaire was designed to test a range of hypotheses taken from the list in Appendix 3. This method was selected as the most efficient way to collect the amount of information required in the time available. The coverage of employment attitudes which was obtained via use of the questionnaire could never have been achieved by interview alone.

The survey was designed for distribution among shop-floor workers in the units chosen to form the research programme (see appendix 2). Similar schedules were drawn up for use with other groups - managers, technical staffs, quality circle leaders and facilitators - but these were used at interview. Both quality circle members and non-members were included in the distribution and questions were included to reveal any attitude differences between these two groups.

It was hoped at the outset to use established attitude scales which had already been proven in use in social science research (for example, see Cook et al., 1981). Unfortunately, however, these scales generally consist of a very large number of different components and still do not always achieve overly impressive consistency. As the length of questionnaire was limited by time

and resource constraints, both for researcher and company under study, it was decided to design a unique format to meet these constraints.

The finished version is presented in Appendix 5. This edition is the one used during the final phase of the research programme (Run 3) carried out in 1984. Although the scales and component variables remained constant throughout the programme, slight amendments were made and are now described.

The covering letter was amended for each run to provide an explanation of the purpose of the repeated survey in each instance. The order of questions was altered between the research runs, to serve two functions. Firstly, it changed the general appearance of the form to some degree; this was thought prudent to give an aura of novelty to the repeated survey. Reordering of questions also helped to ensure that response bias was minimised. Questions at the end of a survey or at the extremes of a page are particularly vulnerable to receiving less attention from subjects, particularly those unhappy about completing it. Alterations to question order ensured that it was not always the same ones which received this cursory treatment. It was similarly possible to vary the negative and positive component variables in each scale.

The survey form is based on five-point Likert scales, made up of component variables of both positive and negative direction. The format has been designed for speed and ease of completion by shop-floor workers of average literacy. No time provision for completion at work was given; respondents had to be asked to fill their form in in their own time. For this reason, a fairly short format was required to ensure a good response rate, even though this meant sacrificing potential accuracy on the attitude scales.

The survey was entirely voluntary and it was emphasised at the outset that no pressure should be brought to bear on respondents to complete or return the form. This was thought to be in keeping with the philosophy of quality circles. Also, since no sanctions were available, any attempts at compulsion would have been futile. One possible consequence of this voluntary approach, of course, is a bias in responses, as it is to be expected that those most favourably disposed to quality circles would choose to complete the questionnaire. Those who held negative views were less likely to take the time to fill it in.

It is difficult to overcome this problem, since it is an intrinsic element of the technique. Strenuous efforts were made to ensure that the distribution was truly random and that personal contact was made with each respondent at some level, each time. Thus it was hoped that a true cross-section of opinion was at least represented at the outset, and that by associating the form with a personal request for completion from an individual not associated with the company would help (rather than the anonymity of a mail shot). The distribution methods are discussed more fully below.

As well as stressing the voluntary nature of the survey, the covering letter emphasises confidentiality. This was considered a further method of ensuring a good response rate (with adequate representation from all viewpoints), as well as being ethically desirable. Each form had an envelope attached together with instructions that the completed form should be sealed inside. It was hoped this would reassure respondents that their views were being treated in confidence. A serial number was assigned to each form, however, and records kept showing the work domain each batch

of forms had been distributed in. Thus it was a simple task to monitor rates of return by work domain. If any areas had returned forms at a lower than average level, then it was possible to investigate and speculate the reasons, taking into account any factors which might have affected response rate. It was postulated that workers in overloaded work areas may not respond too well, or recent unpopular reorganisations may spark off hostile reactions to any subsequent intervention of this type. In fact, one work domain in unit 32 during Run 2 (1983) showed a response rate well below average (30%). This could be explained by the presence of a production supervisor openly hostile to quality circle activity. Similarly, in unit 22 during Run 3, the response rate was well below that of Run 2 (44% as opposed to 80%). The unit had recently undergone reorganization and was experiencing a great deal of pressure to meet targets. Quality circle activity had become spasmodic, and so interest which was previously strong had diminished. Surprisingly, this low response rate was just as marked for quality circle participants as for the rest. (See Table 7 in Appendix 9, for response figures).

The guarantee of anonymity was designed again for ethical reasons as well as to encourage a good response.

Distribution methods were crucial. Wherever possible, a list of employees' names was obtained and a set of random numbers used to select those from the list who would receive a survey form. During the pilot, it was decided to see each individual selected in person in a room away from their work area to explain the purpose of the survey and ask for speedy completion. This proved to be extremely time consuming, since the arrangements became complex. For Run 2, therefore, each individual was seen whilst at

their work. For Run 3, when the survey was familiar to a large number of employees, the list of names selected was given to production supervisors, for distribution and a follow-up done by the researcher a few days later. Collection was done via strategically placed sealed post boxes in the work areas.

Quality circle members received the forms at meetings and out of courtesy were given them before distribution to the rest of their work domain.

The determination of sample size proved more of a problem than had been anticipated, however. Initially it was planned to distribute to a number sufficiently large to generate an appropriate random sample for statistical purposes. It became clear, however, during the pilot run, that this would need to be abandoned. The desired sample size turned out to be smaller than the number of quality circle participants in the unit, but it was apparent that every quality circle expected to be included in the research scheme, such was their commitment to the quality circle programme. It did not seem prudent, therefore, to leave some of them out. From then on, the sample selected always included every work domain where a circle was in operation. In addition, every quality circle member received a questionnaire form.

At the same time, all efforts were being made to ensure the sample of non-participants was truly random. Thus, the result was a sample biased in favour of quality circle members. This situation could only have been avoided by distributing the survey form to all unit employees, to ensure that the true proportion of participants and non-participants were represented. It was considered, however, that such blanket coverage would have been so time consuming as to prevent the personal intervention which seems

to ensure a good overall response. It was hypothesized that this approach would have led to a lower response rate in general, so that the total number of completed forms would not be much greater than if a sample of non-participants had been taken.

To verify this supposition, data from all runs was analysed in two different forms - once as a complete set, and once as a random sample generated from the data set, to see if significant differences occurred. This was done for both individual units and for the whole data set on each run. The results indicate that no such difference occurs, which leads to the conclusion that in the units studied there is little difference discernible in this study between the attitudes of quality circle members and their non-participating colleagues. For more detail the reader must pass to the results in Chapter 6.

5.4 The Interviews

These can be assigned to two different types - those directed at the shop-floor in order to provide a test of the questionnaire, and those with other company personnel designed to elicit attitudes to quality circles as well as to glean factual information. Each will be discussed in turn below.

Shop-floor workers were interviewed after the questionnaire had been distributed to them, generally during the second week of a two-week research run and were selected at random from lists of names. As has already been mentioned in the preceding discourse, these interviews served a two-fold purpose - to furnish a reliability check of questionnaire responses and to extract more information, generally of a qualitative nature, particularly from

quality circle members. For this last reason, the quality circle member checklist turns out to be twice as long as for non-participants.

The interviews were designed to last for a maximum of twenty minutes, but this would depend on the loquaciousness of the subject. This also allowed for changeover between interviews and generally provided for some write-up time; the company had stipulated ten minutes only per subject. Quality circle members were expected to take longer to interview than non-members.

The checklist was followed to ensure consistency in questioning, although some probing and exploration of areas of discussion did occur, particularly with subjects who appeared to be especially interested in the interview. Prompt cards listing response alternatives were designed to show to the interviewees and enable them to choose their response carefully. For each card there was an alternative with the responses arranged in reverse order. Care was taken to ensure that half of the subjects interviewed in each unit saw each type of card. This contributed to accuracy of response and ensured that any tendency to pick answers near the top or bottom of the card would be cancelled out, should it arise.

The second type of interview was of a less structured kind. These were aimed at company employees higher up the organizational hierarchy who had not responded to the questionnaire. They could be expected to talk more freely about their ideas and attitudes, and so wide-ranging discussion could be anticipated. Nevertheless, it was still necessary to design checklists to ensure consistent

questioning and that all necessary topics were included. No specific time allocation was given when the field work was planned although an hour was nominally allotted to each interview.

The first was directed at quality circle leaders. These had filled in an attitude survey and so their ideas formed part of that overall data set. A simple aide memoire was constructed to guide the discussion, which was deliberately unstructured to allow feelings and attitudes to emerge.

For staff and engineers a separate schedule was drawn up (see Appendix 6). This included areas of discussion drawn from the hypotheses and was piloted as part of a separate field exercise. Two questions, 1 and 2, are on this schedule which were included only during Run 3 concerning key results set for quality circles. This was highlighted as an area which had not received adequate coverage during Run 2 and so was inserted into engineering and management interviews. It was piloted briefly and added for the 1984 series. Two forms (K and L) were prepared which were given to subjects to complete at the commencement of the interview. From then on, the discussion was unstructured but covered the points on the interview checklist.

The same formula was applied for managers. They were generally happy to give their opinions with little prompting, so a checklist was an essential guide for directing conversation.

These checklists were designed to throw light on several dimensions of attitude which were expected among engineers and middle management. These dimensions are presented in Appendix 9, together with the data collected along these dimensions. They consist of:

- the view of quality circles as a way to get tasks completed; the view that quality circles are designed to achieve less tangible objectives (denoted "task").
- a high degree of interest in quality circle activity; a low interest shown (denoted "interest").
- the amount of previous direct involvement in quality circle activities (denoted "involvement").
- the view that quality circles are a tool for management to control; the view that quality circles are an autonomous entity (denoted "control").
- the extent to which the individual is in favour of quality circles (denoted "approval").

The Appendix (10) gives some examples of the criteria used to assign interviewees to these dimensions. They were all treated as dichotomous, and the final one, "approval", is a representation of overall attitudes based on the judgements made in assigning individuals along the other dimensions.

Other interviews, with facilitators and with senior management, were entirely unstructured and tended on the whole to be much longer, lasting perhaps two or three hours. An aide memoire was prepared beforehand, tailor-made to the individual interview since such information is used qualitatively rather than quantitatively this was considered an acceptable technique.

5.5 Observation of Quality Circle Meetings

In order to test the hypotheses relating to the quality circle as an effective group (see Appendix 3), it was desirable to attend quality circle meetings at the various units under study and observe meetings in a systematic way. It was also possible in

this way to glean information which would aid the testing of hypotheses in other areas. For example, study of the behaviour of managers when invited to attend quality circle meetings should disclose some aspects of their attitudes to quality circles and by extension the measure of support they were prepared to lend.

The data to be collected fell into two broad categories: the group process observation, generating records of interaction during quality circle meetings; secondly, information relating to the circumstances of each meeting, which tests relevant hypotheses and provides a context for each meeting, essential when comparing the interaction across meetings and across groups.

The methods used to ensure the requisite facts were taken down at each meeting are shown in Appendix 7. It was decided to use a tried and tested format to record interaction, in order to ensure that resources were efficiently utilized, particularly during the pilot programme. The deployment of an established observation checklist meant that effort could be directed towards the research methods which were of necessity original, such as the questionnaire and interview checklists.

The format which was chosen was based on the work of Rackham and his associates (1971) as shown in modified form by Cooper (1981). The initial site visits permitted attendance at a number of quality circle meetings and detailed notes were made of the structure of the meeting and the types of interaction which predominated. This was essential since observation of this type of problem-solving meeting, outside the laboratory and without professional, practised leadership is not well documented in the literature. It became apparent that the Rackham scheme was most appropriate to the situation.

This format consists of a series of categories of interaction which together represent the full range of behaviours which can be expected during a meeting. It was necessary to observe proceedings strictly as a non-participant and to assign extant behaviours to the category which best described them. The convention in such observation programmes is to record both initiator and receiver of each interaction, but for the purposes of this research it was decided to record initiator only. Due to the limited number of meeting which could be observed (see Appendix 7) the data could really only be used to afford comparison between whole groups, either over time or across groups. The maximum number of repeat observations of the same quality circle was five, insufficient to draw conclusions about one individual group in terms of role structure of status hierarchies.

At the beginning of each meeting, individuals were assigned a number, the leader always being number '1' to facilitate identification. Where interaction was initiated by the group as a whole, this was recorded by the identifier '0'. The facilitator when present was denoted by 'F' and any guest by 'G'. Interaction was recorded over time, sub-divided into five minute intervals to aid computer analysis (discussed in Chapter 6). The entry and exit of participants was recorded, as well as breaks in group process (it was the practice for coffee to be taken during meetings in some units).

The Observation Checklist (see Appendix 7)

When piloted in Run 1, however, it was discovered that some amendments and additions were necessary to the interaction schedule to ensure all the required dimensions were included. The categories taken straight from Rackham (1-13) are mainly

self-explanatory in their titles, or where clarification is required, are well explained in the original sources (that is, Rackham, 1971, and Cooper, 1981). The discussion below centres on those which have been added to and the new ones specifically designed to meet the needs of this research programme.

A particularly important item was the initiation of joking behaviour. In some meetings, especially where leadership was weak, jokes and humorous exchange became prominent and tended to dominate the proceedings at times. On occasions it meant that the task element of the meeting was abandoned in favour of banter between group members. It was decided, therefore, to record the initiator of such behaviour, and include this under the category of 'open behaviour' (see Appendix 7). Cracking a joke exposes an individual to the rest of the group, since they be supportive, by laughing or via some other suitable response, or undermine him by silence or other non-receptive behaviour. Correspondingly, the response of the group to the open behaviour was allocated to the 'supporting' category or to others where appropriate.

It was also considered useful to add a category 'decision' to record the taking of decisions. Since quality circles are set up to meet specific, self-determined objectives then the frequency at which each group can reach decisions will give some indication as to their success as a problem solving group. This category was marked using a simple tally system, the only distinction drawn here being between decisions reached by consensus and those taken by individuals (including sub-groups).

The use of feedback during circle meetings was also noted, similarly using a tally system. The quality circle problem-solving process, as described in Chapter 2, presumes the use of feedback

by the group to monitor the success of implemented solutions, to learn from previous experience so the group progresses and to make full use of other people's ideas and comments about quality circle activity. It was thought to be an important pointer to the maturity and overall effectiveness of an individual quality circle if feedback were constantly and properly used. The first aspect is easy to measure, the second more difficult, especially in the context of meeting observation.

The category "influence" was included to record instances where certain members tried to persuade other individuals to adopt a particular point of view, particularly if attempts were made to 'pull rank' or adopt a position of superior knowledge or expert status. This was believed to be significant for two reasons: firstly, since decisions were intended to be reached by consensus, this should preclude the pronounced use of influence; secondly, the presence of guest experts was hypothesized to result in these experts guiding decisions towards their own beliefs about appropriate solutions.

A further category "subconv" was used to note occasions where subsidiary conversations developed in the group. It was thought that the simultaneous presence of rival conversations, particularly if repeatedly among the same sub-groups of members, could throw light on either the ability of the leader to maintain and direct group discussion or point towards a group with too many members to promote effective interaction.

In a similar vein, "deviation" relates to the number of times the main subject of discussion was lost to other topics. This relates mainly to straying towards either non-task conversations, for example, about social activities or the previous evening's

television, or into areas inappropriate to the quality circle format such as personality clashes, areas of collective bargaining or simply into topics related to work but not on the agenda. Again frequent marks in this category would demonstrate something about the quality of leadership, as well as have more general implications for the efficacy of the quality circle concept in general. It could be anticipated that a shortage of appropriate task work would allow the quality circle to degenerate into such deviation on a regular basis.

The final category to be added was denoted "sleepers". It was not unusual for individuals to purposely withdraw from discussion either for part of a meeting or for the whole hour. The identity of such members was noted, together with the length of time their non-participation lasted. It was important to distinguish between those who were merely silent, but actively listening or who lacked confidence to make individual contributions but joined in with group-initiated interaction, from those who were clearly uninterested in the discussion or who were making their dissatisfaction known to other members by emphasising their withdrawal (classed as "defending", "blocking" or "shutting out" behaviour where appropriate).

For this reason, it became vital to note at the beginning of the meeting the identity of the minute-taker. When fulfilling this task, a person could not initiate a large amount of interaction, but would be making their contribution through active listening and by producing the minutes.

The Meeting Record

A sheet was used to record the circumstances of each meeting and served two functions, as has already been outlined above: to provide information to allow comparisons and to represent an additional data source to test hypotheses. It covers the particulars of the meeting to identify interaction records, use of available information resources and quality circle techniques and impressionistic data for qualitative use only.

Other Records

The information from the meeting record sheets was transcribed onto a separate record sheet kept for each individual quality circle. This sheet permitted a quick check of the conditions prevailing in meetings for an individual circle over time.

A master record was also kept of the identify details of each individual group so that changes over time could be detected and noted. A file was also maintained for any documentation generated from meetings - copies of minutes, reports, presentations or other discussions and meetings - which enabled a dossier to be compiled on each circle. In addition, a narrative report was compiled after every meeting allowing a full and detailed picture of each quality circle to be built up over time.

After each programme of field work, the interaction records were transcribed to a computer-compatible format and analysed using tailor-made software commissioned by the researcher. This generated a series of plots for each meeting, for the whole group and for selected individuals where appropriate. These are discussed in greater detail in Chapter 6.

5.6 The Classification of Quality Circle Task Work

Several of the hypotheses featured in Appendix 3 concern the relationship of the task work of a work domain and the task work of a quality circle operating there. In order to test these hypotheses, therefore, it is necessary to devise ways to categorise both the task work of a work area and the task work of quality circles.

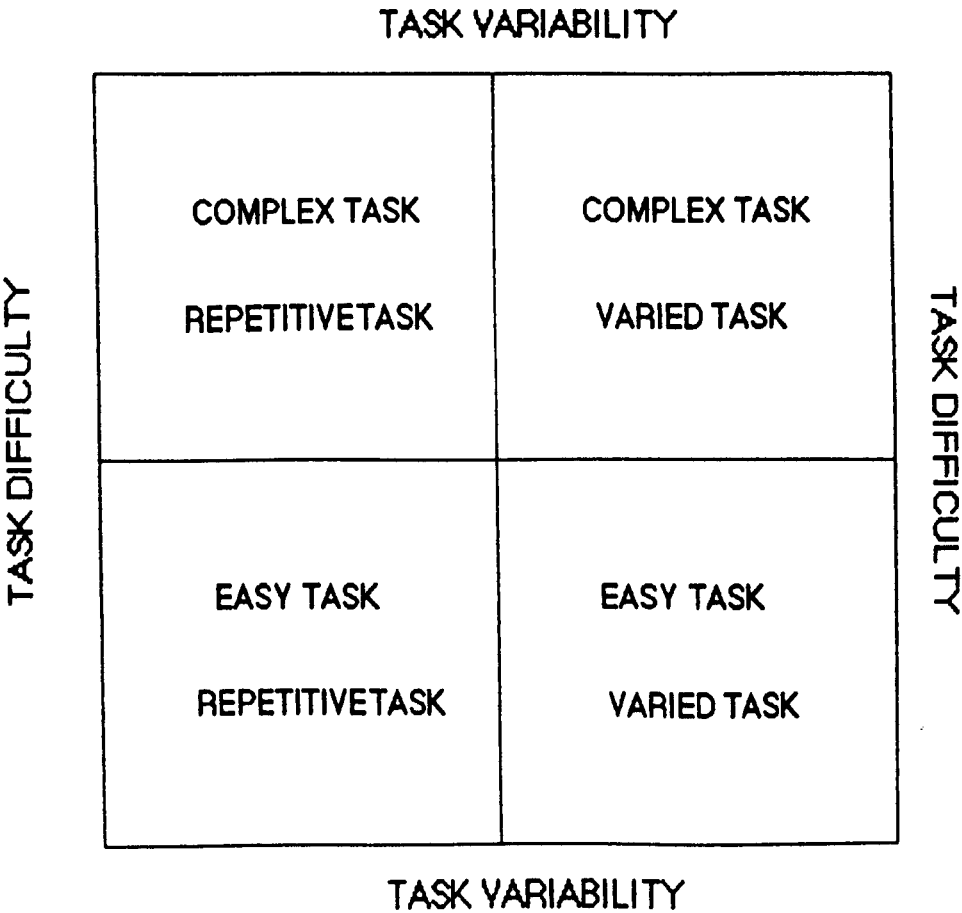
Tasks in the Work Domain

It was necessary to discover a satisfactory method of classifying task work. Socio-technical theory underlies the basic philosophy on which this research is founded, but by its very nature disqualifies itself as an effective way to categorise task work. In acknowledging the relationship between the technology and social structure of the work situation, it predicts a complex and uncertain organisation (Trist, 1981). Trist outlines a nine-step model of work-system analysis which demands the sophisticated breakdown of an individual work unit (or "target system") in terms of its interrelations with others, an altogether too deep an analysis to be practicable for these purposes.

A more basic approach was found in the work of Perrow (1967). This draws out two basic dimensions for the analysis of task work - uncertainty and variability. Such synthesis was elaborated by Van de Ven and Delbecq (1974) who devised two indices to measure work structure, task difficulty and task variability. These are based on questionnaires given to employees, asking them to describe aspects of their jobs. Unfortunately, time constraints did not allow the full use of these indices, instead it was decided to assign work areas to a four cell matrix, based on Van de Ven and Delbecq's dimensions (see Figure 5.1 and Appendix 8).

FIGURE 5.1

ANALYSIS OF TASKS MATRIX



A checklist was compiled for both task difficulty and variability, based on the indices presented by Van de Ven and Delbecq (1974). These checklists were used during interviews with those individuals who were able to provide the necessary information, for example, production supervisors and managers. The information was then used to decide how each individual work area was to be fitted into the matrix in Figure 5.1. These checklists can be found in the Appendix.

It was hoped that this process would embody a systematic method of classifying task work. Their use has been slightly different to that in the original source. The dimensions have been shortened to include only the scope of shop-floor production work, rather than the full range of production effort. A highly skilled production operator may be performing a complicated and technical variety of assembly work requiring a good deal of concentration, dexterity and individual judgement. This would be a complex task when compared to that of a press operator in a machine shop, but not if compared to the kind of work carried out by a development engineer. In order to ensure the scheme is meaningful, therefore, the dimensions are restricted to the scope of work generally performed by quality circle members.

The judgement on task also applies to the majority of jobs in a given work area. In any one area there will always be a range of tasks in terms of both difficulty and variability, from the production supervisor to the "sweeper up". It is intended to describe and categorise the tasks done by the majority in a work area.

Quality Circle Task Work

Having developed a system for categorizing task work in general, it was necessary to devise a compatible scheme for assessing quality circle task work in particular. It was not possible to use the same format to that used for everyday task work, since the range of information required was not available. It may have been feasible to analyse quality circle projects under way at the time the field work was conducted, but for tasks completed in the past, records did not contain sufficient detail of the appropriate kind.

It was originally intended, therefore, to use the headings recommended to the quality circles to enable them to classify potential problems from their work domain, which would normally be represented on a cause and effect diagram. These are:

Manpower

Machines

Method

Materials

Environment

It soon became clear, however, that these categories are not mutually exclusive; many tasks could be fitted under several headings at any one time. Again, projects completed in the past presented a problem. Whereas it may have been possible to ask groups themselves to categorize current projects in this way, for task work long since filed away, this would have presented many difficulties.

The solution found was to scrutinize quality circle tasks past and present and draw out categories which would fit what was actually there. It was discovered that there were six broad areas of task work encompassing:

1. quality control related problems, including scrap and reject problems;
2. the improvement of production procedures;
3. cost reduction;
4. ways of improving output;
5. the work environment;
6. other (see Appendix 8).

The order here is not significant. Since the remit of quality circles is traditionally to look at quality control problems, it is to be expected that this would figure prominently when analysing quality circle projects. "Improving production procedures" represents quite a broad category and would comprise all projects which look at the way work is done. It includes such things as the redesign of tools, product handling and storage, work flow and production bottlenecks, minor product redesign to ease manufacture, and so on.

These two categories would be anticipated to form the bulk of quality circle task work. Appendix 8 contains a summary of the quality circle task work examined during the research programme. The summary centres around three units only, since these represented the major proportion of projects examined.

Table 6 shows that the above hypotheses are indeed verified. 71% of all quality circle projects can be assigned to categories 1 and 2, the bias slightly in favour of category 2. The same pattern is consistent for all three units studied.

5.7 Summary

This chapter has described the research methods used and has tried to show some of the problems involved in designing a wide-ranging scheme. It is important to note the constraints of time and resource which have been as significant as the methodological demands of social science research. It is hoped that good practice has not been compromised by these difficulties.

The next chapter goes on to discuss the data which has been collected using the research methods.

CHAPTER 6 - THE DATA

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CHAPTER 6

THE DATA

6.1 Introduction

This chapter contains the data which was collected using the research method described in Chapter 5. The data is presented in three different parts, the questionnaire, the interviews and the group process observation of quality circle meetings. To preserve the flow of the discussion, the tables of data and diagrams where appropriate are located in the appendices at the back of this thesis.

Each set of data is fairly self-contained. The next chapter goes on to discuss the conclusions reached.

6.2 The Questionnaire

This attitude survey was designed to test specific hypotheses taken from the list in Appendix 3. The hypotheses which were selected for testing in this way implied three basic sub-sets of attitudes to be isolated and measured - general attitudes to work, overall attitudes to quality circles and attitudes to specific aspects of the quality circle programme. Reference to Appendix 5 reveals the scales designed to fit in with this overall pattern, which formed the main body of the survey. Also included, however, are questions designed to give an indication of the characteristics (age, sex and so on) of the survey population to

determine whether any such factors were influences on attitudes. The remainder asked for specific information which could also be used to compare attitude responses.

The resultant data set is presented in Appendix 9. Before summarizing the data and indicating the light it throws on the hypotheses, however, it is proposed to detail the techniques used to analyse the completed questionnaires.

6.2.1 Methods of Analysis

The completed questionnaires were returned by the respondents sealed in envelopes, and a preliminary check was made to ensure the seals remained intact. After opening, the questionnaires were sorted according to work area and comparison made with the records held of distribution. Any remarkably low or high response rates were to be noted for later use.

After encoding and input to the mainframe computer, the data was analysed using various subprograms of the Statistical Package for the Social Sciences (Hull, Nie et al., 1975, 1979).

As previously mentioned in Chapter 5, the structure of the samples which had been obtained in each unit gave cause for concern, due to the imbalance between quality circle members and non-participants, the former group being over-represented. In 1983 (Run 2), quality circle members represented 14% of employees working on the shop-floor (see Appendix 2, Tables 1 and 2); examination of questionnaire respondents for Run 2 shows that 50% were quality circle members (Appendix 9, Tables 7 and 8). In 1984 (Run 3) this was even more marked, as only 12% of the *weekly* paid employees were quality circle members, yet 51% of the final questionnaire sample said they belonged to a quality circle.

To overcome this problem, it was decided to construct stratified samples from the overall data set, weighted to give the correct balance between members and non-members. Weighting fractions were calculated for each unit and individual cases selected at random from the total number with a probability equating to the weighting proportion. The resultant samples were then compared to the total data set to detect any differences between the structured samples and the complete data, the process being repeated for each unit. It was postulated that if there was any bias due to over-representation of quality circle members as a sub-population, then there would be significant differences on the attitude scales and other variables between the constructed samples and the overall data set derived from the research runs. This analysis showed, however, that this was in fact not the case and that comparable results were obtained. As it was thought preferable to use as many cases as possible in analysing the questionnaire since greater accuracy in predicting attitudes was sure to result, the total data set was preferred to these stratified sub-sets.

Table 7 in Appendix 9 shows the data base which applies throughout the ensuing discussions of questionnaire response. The 1983 and 1984 data are shown; Run 1 (1982) was the pilot scheme and so the data cannot safely be used in comparison with Runs 2 and 3, as it was not derived from a consistent basis.

It will be noted that Unit 13 was not included in 1984 (Run 3). Although access to the unit was granted for a repeat survey, on arrival at the site it was discovered that all quality circle activity had been abandoned in the unit. In addition, an industrial relations problem had arisen so that access was denied.

Although it was hoped to pay a later visit to fill the gap in the data set, this was not possible before the end of the research programme.

Having established that the imbalance in the data was unlikely to cause problems, the more complex data analysis could then proceed. Attitude scales were constructed on a simple additive basis, after the component variables had been inter-correlated to verify their suitability for use as a scale (to check that the responses showed comparable patterns so that the component variables were all associated in the same direction). Table 9 in Appendix 9 shows the matrix of correlation coefficients derived (Kendall's tau). The matrix shows the value for an exclusive correlation of the attitude scale and the component variable. For example, overall job satisfaction (Scale J) is a five item scale; each correlation shown is between four items added together and the other individual variable. The component variables are detailed in Table 10.

Scrutiny of the matrix reveals disappointing results in some cases. For example, variable J2 ("my job is secure") always achieves a consistently weak, but mostly significant correlation. In other instances, such as variable P3, the correlation is weak only in certain units. On such occasions, the offending variable was excluded from the corresponding scale when later analysis was performed.

This analysis unfortunately led to the rejection of the scales designed to measure attitudes to some specific aspects of quality circles. Scales 4, 5 and 6 (see Appendix 5) intended to assess perceived management attitudes (M), the expectation non-pecuniary rewards (R) and the dissemination of quality circle

information (T) all failed to demonstrate association between component variables. Instead of being used additively, the variables have been analyzed individually (see the following section).

Having arrived at satisfactory scales, these and the other variables treated separately were analysed according to the requirements of the research design. The basic techniques were to use straightforward percentages to describe attitudes and characteristics, non-parametric correlations between scales; basic comparison of all variables and scales between units, between research runs and between quality circle members and non-members. A distinct analysis was carried out of responses to the question "What do you think quality circles hope to achieve?" where subjects were asked to nominate objectives from a given list. The following discussion centres on these analyses in more detail.

It was decided to restrict the analysis to these basic forms due to the severe limitations imposed by the nature of the data. It has been noted that many researchers of organizational behaviour indulge in highly complex factor analysis and regression, but such practices have been avoided in this study.

The next section discusses the findings of the questionnaire which are presented in Appendix 9.

6.2.2 Findings and Discussion

Characteristics of the Population (Tables 11-14)

A number of questions at the end of the survey form (at the beginning for Run 2) asked subjects for details of their personal characteristics and their work. These variables have been used to develop a picture of the survey population and to see if any significant differences emerge.

Table 11 shows the age structure of the sample over time. It can be seen that, although there is a fairly even spread through the age groupings, there is a cluster around the middle, with over half (51%) of the population for Run 2 being between 36 and 55, together with 49% within the same range for Run 3. An increase in the youngest groups is discernible over the research programme, with the percentage between 16 and 25 increasing from 15% in 1983 to 21% in 1984. 1984 shows a remarkable difference between units, units 34 and 22 both show an age distribution skewed towards the lowest end. For Unit 34, 33.3% are between 16 and 25 years of age, for Unit 22 it is as much as 52.5%. Similarly, Units 32 and 14 shows a notable tendency towards older respondents. For Unit 32, 49.9% are over 46 for Run 2, and 68.2% fall into this category for Run 3. Considering Unit 14, 55% are between 46 and 65 during 1983 and comparable 58.5% for Run 3.

Table 12 shows the break-down of the sample into male and female. There is a marked difference in sex composition between the different units, and not one of them has an even balance between male and female respondents. The best approximation is for Unit 32 in Run 3, where 59.1% are male and 40.9% female. The widest disparities occur in the Paignton Units 21 and 22 where the number of women is relatively small.

Although the sex of respondents differs slightly between the runs for individual units, there is little difference overall. The percentage of males stood at 61.5% in 1984 and fell slightly to 58.4% a year later. This was not due to any change in shop-floor personnel; it reflects rather the random nature of the sample (it was not stratified in any way to take account of respondent characteristics) and some changes in areas where quality circle

activity was taking place. In all units, male and female labour tended to specialise in specific areas of work, the men being more prominent in traditional skill areas such as maintenance or metal machining and the women in assembly and test areas. These structures of the sample would therefore depend on which areas had live quality circles.

A specific hypothesis predicted that interest in quality circles would be more intense in male dominated work areas than female. There is no evidence to support this hypothesis. However, it must be noted that, as Table 12 demonstrates, the number of females taking part in the study was insufficient to reach firm conclusions on this.

Tables 13 and 14 show the answers to the questions asking about length of time in the current job and length of time at STC. It is hoped that the different results obtained in these two tables can assure the reader that the distinction between current job (or occupation) and time spent with the company was appreciated by respondents.

The objective of including these questions was to determine whether level of experience, either in the job or in the company, varied between quality circle members and non-members. Again no evidence was found to support this notion. It will be appreciated by examining Table 13 (length of time in current job) that there are appreciable differences between units. Unit 32 has the least experience (in 1983), with an average of 5.2 years.

In 1984, however, the picture changes. Unit 21 has the highest score of 10.2 years, which it also does in 1983 with 9.0 years, showing the highest concentration of experience and a consistency which leads to the speculation that few job changes

have taken place over the year. For the other unit on the Paignton site, however, there is a dramatic decrease from 5-6 years average experience during Run 2 to 1-3 years in Run 3.

Similarly, scrutiny of Table 14 shows a reduction in experience with the company. For the same unit in Run 2, the average was 9-8 years; for Run 3 it was only 3-6 years, the lowest overall. This is explained by wide-scale reconstruction taking part in the unit in the intervening period, causing some redundancies and drastic changes to the organisation of the unit and layout of the shop-floor and offices.

Attitudes to Work and to Quality Circles (Tables 15-23)

Having considered the composition of the population, it is now intended to discuss the attitude scales and the findings related to them.

As noted in Section 6.2.1, only three attitude scales could justifiably be used out of the original six; the other variables are discussed in a later section.

Tables 15-20 present a summary of the attitudes displayed to work in general and to quality circles. These have been measured along Scales J, P and I, called overall job satisfaction (although it is acknowledged that this is a crude measure for such a complex phenomenon) overall attitude to quality circles and perceived impact of quality circles. The component variables for these are to be found in Table 10, if any reference should be necessary. All the scales used in the survey have been designed to be tested in three ways:

- to examine differences across units.
- to examine differences across years.
- to examine differences between quality circle members and non-members.

Analysis has been carried out on variables and scales accordingly and attitudes prevalent in the sample are described, while at the same time drawing out differences between units, over time and between quality circle members and other.

Tables 15 and 16 explain Scale J. In order to simplify the data, it has been summarized into three attitude categories, "positive", "neutral" and "negative" relating to the three value ranges of scale scores (that is on a five-point scale: two positive, one neutral and two negative options on each variable). If it is accepted that the component scale variables are all showing a distribution of attitudes skewed in the same direction, then this approach compacts what would otherwise be an unwieldy table of figures.

It can be seen that for Run 2 (1983) five out of the six units show a similar pattern, with attitudes split roughly 50/50 between neutral and positive attitudes to work. For Unit 21, however, the picture is somewhat different with 61% in the neutral area and 25% negative. This is a little surprising, since this particular unit had enjoyed a level of stability and high performance unparalleled in the rest of the company at the time (or at least in the portion studied).

In Run 3 (Table 16), things change somewhat. Now it is Unit 22 which stands apart, as 37.5% of its respondents are generally negative towards work-oriented questions, which possibly reflects

the upheaval mentioned earlier. Unit 32 again is the most positive of the six. 50% of respondents in both runs are positive about work.

It would seem, therefore, that on the whole, the respondents during the study are reasonably content with their work. The black spots seem to be found where reorganization has occurred, although it must be said that few of the units escaped some restructuring. It is not the purpose of this study to probe any further into job satisfaction, however, since the measure is very rough and the complete range of information required to make such judgements has not been systematically gathered.

Turning now to Tables 17 and 18, here is found the attitudes displayed towards quality circles (Scale P). Again, as with Scale J, the general view is of positive or neutral responses. In 1983, Unit 34 comes out as the most positive, with 50% of respondents being in favour of quality circles and only 5% taking a negative view.

For Run 3, there has been some rearrangement of views. Unit 21 stands out as shifting towards the positive (49.1%) from the neutral (66%); Unit 22 has shown a reverse effect, however, with a score of 36.5% in favour in 1983 compared with only 25% in 1984, although 65% were neutral in the later year.

Scale I is a measure of the perceived impact of quality circles in the unit and in sum provokes a more negative response than the previous scale. In 1983, apart from in Unit 34, where attitudes are evenly spread, the overwhelming opinion is that quality circles have not impacted at all. In Unit 22, as many as 58.8% hold negative views, and Unit 32 is not far behind.

To look at 1984 (Run 3), attitudes have shifted to some degree. The overall impression is of a slightly more neutral view. For example, Unit 22 is now 55% neutral. However, one of the Great Yarmouth factories has now deteriorated from 30% to 45.5% negative.

In fact, there is a significant difference in attitudes to quality circle impact across the units studied. An excellent way to show the difference is to examine one of the questions which make up the scale. Table 21 shows the responses given over the two research runs. The question "In general, how much has the way this unit operates been changed by quality circles?" seems to arouse a mainly indifferent response. For Run 3, Unit 13 is the most enthusiastic about quality circle impact, with 5.4% feeling that the unit had changed completely and 13.5% that it had changed "quite a lot". Unit 32 is the most negative, 55% felt that the unit had not changed at all. For Run 4, the picture is quite different. Unit 32 is now quite positive, with 18.2% claiming their unit had changed "completely" or "quite a lot". Interestingly, however, it remains at the same time the most negative, with 31.8% persistently perceiving no change at all.

It seems then, there is little hostility towards quality circles at least. Attitudes are quite favourable overall, with very little negative response. Over time there has been a general shift toward the positive, which would seem to indicate that longer exposure to quality circles has sweetened attitudes towards them (even if a considerable proportion still hover around the neutral).

Unit 22 has again shown a different pattern to the rest. Again, significant reorganizations have depleted quality circle activity as well as being associated with a deterioration in attitudes to work. A corresponding fall in enthusiasm for quality circles is hardly surprising. The Great Yarmouth units (32 and 34) continue to confound logic, however. Both have experienced some restructuring and haphazard quality circle programmes, yet attitudes do not follow consistent direction, being both positive and negative at the same time.

Perhaps the most critical distinction to be anticipated when discussion attitude patterns will be between those of quality circle members and people who do not participate. If quality circles can achieve the overall company objectives discussed in Chapter 2, then quality circles should effect some adjustment in attitudes, even at the simple level being tested here.

Table 22 is a summary of the differences found for the two data runs. Each scale was correlated in turn with the variable showing whether the respondent was a member of a quality circle or not, and a value for Spearman's rho (r_s) calculated using an SPSS subprogram. It can be seen by reference to Table 22 that significant relationships were found in some cases.

For Unit 34, quality circle members tended to be more positive towards the quality circle programme, during Run 3 at least. Unit 32 was comprised of two factories a few hundred yards from each other, but which operated independently at shop-floor level. In most cases, attitudes were similar in both factories and so that data from them has been aggregated. In this respect, however, they do show differences during Run 2. For one factory, the pattern is for quality circle members to demonstrate more

positive attitudes to quality circles and to perceive greater impact on the unit. In the second factory, however, there was no discernible separation in attitudes in these respects, but there was a link between quality circle membership and attitude to the job. For 1984, respondents in the two factories reacted identically. There was a difference between attitudes on all scales here.

Unit 21 respondents were all of the same mind in 1983, when no correlations were found to be significant. In 1984 (Run 3) however, there were quite strong associations between quality circle membership and attitudes to the programme. It would seem there has been some polarisation of feelings during the intervening year.

Unit 22 also demonstrates an attitude change, but in the opposite direction. For Run 2, a relationship exists between Scale P and quality circle membership; by a year later, this had disappeared.

Considering Unit 14, only weak relationships were discernible, but they do show traces of a move towards distinct differences in attitude, although this is not proven to any significant degree.

It would appear from this analysis that it is by no means certain that attitudes can be expected to differ with quality circle membership. Even though some association has been discovered at times, it has not been shown to persist throughout the research programme, which leads to the conclusion that attitudes to quality circles are not affected by quality circle membership.

The final aspect of attitude scales presented is visible in Table 23. This has been designed to show inter-relationships between attitude scales. It can be seen that for many units, there is a link between overall attitude to the job and overall attitude to quality circles, at its strongest in Unit 32 for 1983. There is also an association between attitudes to quality circles and perceived impact. This is particularly marked for Run 3. All the units studied here revealed a correlation coefficient greater than 0.5, which would indicate an association exists in all cases. For Unit 34, the value of r_s is 0.80, which would point towards a strong relation.

It would seem, therefore, that it is not participation in quality circles that determines attitudes, but an overall tendency to be favourably disposed to the job and that those who are favourable towards quality circles overall also perceive the greatest impact.

Other Questions (Tables 24-38)

As well as the attitude scales described in the preceding paragraphs, additional questions were included in the questionnaire to try and draw out extra information. It is proposed to discuss them, together with the attitude variables which were originally designed to form scales, but which were impossible to use in that way.

The first to be presented was Question 4 on the schedule, asking if any change has been introduced to the respondent's work area as a result of a quality circle project. This was hoped to show up the level of awareness of quality circle activity, bearing in mind that the population is skewed towards quality circle participants.

Table 24 shows the answers gained. The most noticeable aspect is the number of "No" answers, despite the high incidence of quality circle membership. Even in units with a high-profile quality circle programme, the percentage of respondents failing to notice change is considerable. For Unit 21, 37.7% say "No" as do 42.7% in Unit 14. (This question was added to the 1984 version of the survey so there is no comparison with the previous year.)

Table 25 shows differences between members and others. It can be seen that differences were found in 3 units, 32, 21 and 14. In all cases, quality circle members were far more likely to answer "Yes", a change had been introduced, although only about three-quarters of quality circle members perceived a quality circle solution in action.

Correlation with other attitude scales for the whole data set shows a relation between perceived impact, Scale I, and the introduction of a specific change ($r_s = 0.48$ at .001 significance) and Scale P, overall attitudes to quality circles ($r_s = 0.38$ at .001 significance).

Question 5 asks "In your opinion, have any quality circle projects resulted in improvements which have made your job easier?". This was to be answered with a simple "Yes" or "No". Tables 26 and 27 show the results obtained, for 1984 only. This question was another straightforward attempt to assess, very roughly, the perceived success of quality circles at shop-floor level (to tie in with the parallel attempts to discover the same things during management interviews - see Section 6.3).

Answers here were more evenly split than for the previous question. Unit 32 showed the most marked difference, with only one-quarter saying that an improvement had been introduced. Unit 14, only had 31.7% saying "Yes". For the rest, a rough half-and-half division was uncovered.

Differences between quality circle members and others were again found in Units 32, 21 and 114. Overall, in each unit, a greater proportion of quality circle members said "Yes" a change had been introduced, Unit 21 having the widest disparity whereas 62.3% of quality circle members answered affirmatively, only 16.2% of non-members did the same. It is significant to note that for Unit 32, as many did not reply at all as responded "Yes".

Similar relationships were found between this variable and attitude scales as were drawn out with Question 4. Here, the value of r_s when correlating the answers to attitudes to quality circles (Scale P), was 0.45, and for perceived impact (Scale I), it was 0.49, both at 0.001 significance level.

Once again, it appears that there is a group of respondents who adopt similar attitudes to quality circles in all respects. Although in this case, differences were found between member and non-member attitudes, this must be balanced against the fact that only one data run contained these questions. It has been noted earlier, that differences such as these have not been proved to persist over time.

The next two questions to be considered, 13 and 21, were originally intended to form a scale quantifying the way shop-floor personnel perceived management's attitude to quality circles. Unfortunately, the two items do not correlate sufficiently to be taken together, so they will be discussed in brief individually.

Question 13 asks respondents to give the level of their agreement with the statement "Management here think quality circles are a good idea". Tables 28 and 29 show the responses offered. Looking at the pattern of answers in Table 28, it can be seen that for both runs, and in most units, the majority agree that management approve of quality circles. In some cases, for example Unit 14, or Unit 22, a large number are indifferent, but only a small proportion actually disagree or strongly disagree. Comparison over time shows that Units 32, 22 and 14 show a change of attitude, although directions differ. Units 32 and 14 have become more positive over the year, but Unit 22 has become more negative. Whereas in 1983, 68.8% in this unit agreed or strongly agreed, only 47.5% held similar views a year later.

In terms of differences between quality circle members and non-members, Table 29 shows the response figures for the units where such distinctions were found. For Run 2, quality circle members were more sure of management support than their non-participating colleagues. For Unit 14, for instance, 66.7% of quality circle members agreed or strongly agreed, compared with 31.5% of non-members. In Run 3, a similar pattern was discerned for Units 14 and 32, but Unit 21 showed an alternative result. While 81.8% of members felt management approved of them, 85.6% of non-members thought so too. In the latter case, however, a greater proportion (53.2% as opposed to 29.9%) picked the stronger response which is perhaps surprising.

A comparable question was number 21: "Management do not show enough interest in quality circle projects". Answers to this are presented in Table 30, although there is no common pattern. In Units 34 and 22, the attitude is overwhelmingly indifference with

42.4% and 45.0% respectively taking the middle line. In Unit 32, however, as many as 50% agree with the statement and a further 9.1% strongly agree. Units 21 and 14 concur with a fairly even spread of answers along the scale.

Only Unit 14 shows any difference between quality circle members and non-members. Table 31 shows that the tendency is for non-members to be slightly better disposed to management's attitudes, but there is not much in it (50.0% of them disagree with this negative view presented in the question, as beside 30.3% of members).

It is difficult to draw any conclusions about this. It seems apparent that generally, the shop-floor believe that management are in favour of quality circles and are interested in them, but attitudes are inconsistent between units and over time. It is probable that as management opinion and overt support differ, so does the perception at shop-floor level of this support. This will be discussed more fully in the section of this chapter which deals with interviews.

The next set of questions to be assessed was designed to isolate any flow of information from quality circles to those outside the groups, to see if there was reluctance on the part of quality circles, indicative of a hint of elitism creeping into the programme.

Question 16 says "Quality circles do not tell non-members enough about their activities". Table 32 reveals consensus between units on this matter during both research runs, but the nature of this consensus differed. For 1983, the overall tendency was to agree with the statement, but by 1984 feelings had changed

considerably. Most respondents now disagreed that their colleagues showed disinterest in quality circles, revealing a shift over the year.

Table 33 shows that differences exist between quality circle members and non-members for both research runs for Run 2, non-members show an enhanced tendency to agree with the statement that quality circles do not impart information freely. For example, in Unit 34, 50% of non-members strongly agree with the statement whereas 0% of members do the same. In Unit 13, the figures are 55% and 5% respectively. However, a large proportion of quality circle members do agree with the statement, as many as 71.4% for 1983 in Unit 13.

During 1984, in all cases, a greater number of respondents have taken the opposite view. In Unit 34, 71.1% of quality circle members disagree or strongly disagree with the statement, compared with 89.5% of non-members. A similar pattern can be discerned for all units, although the majority disagree there is always a larger proportion of non-members disagreeing.

It seem, therefore, that attitudes of members and non-members have moved closer together over time. In 1983 there was a mismatch of opinion as to whether quality circles were giving enough information about activities, which had lessened by 1984. The direction of attitudes had also changed. A possible explanation would be that the amount of information being passed on has increased, thereby leading people to change their tendency to agree that "Quality circles do not tell non-members enough about their activities". However, there is little evidence to suggest this is the case (particularly since the level of quality circle activity had diminished in some units over the year).

An alternative explanation could be that familiarity with the quality circle programme has made this less of an issue and that expectations about the amount of information that should be imparted has changed. Unfortunately, there is no device in this study to determine whatever this is the case, but it seems intuitively valid.

A similar question was asked at number 14 ("Operators who are not members of quality circles want to know what the quality circles are doing from week to week"). Table 34 figures indicate that in the main, the major proportion of respondents agree, except for Unit 21 where 42.1% disagree. It is interesting that that in this instance, members and non-members agree, since scrutiny of Table 35, which shows that there is no difference between the two groups for this unit, generates this conclusion.

For other units, however, Table 35 shows that non-members are more likely to agree than members in all cases where there are differences. The greatest difference is in Unit 34 where 35.7% of members agree or strongly agree as opposed to 89.2% of non-members. The direction of attitudes, however, is identical.

This would seem to indicate a shared view that outsiders are interested in quality circle activities, in all except one unit. It is also noticeable, however, that quality circle members do disagree (42.9% of them in Unit 34) and are more likely to do so than non-members in some units. There is evidence that the quality circle members may be justified in their opinion. Interviews with non-quality circle members in an area where a quality circle notice board always showed up-to-date reports of circle activity. reveal that a considerable proportion (about two-thirds) still did not have even the vaguest idea of the current activities, even

though the information was freely available to them. This was in Unit 34, where the largest proportion of quality circle members disagreed that non-members were interested. It should be added, however, that most attempts to inform which were observed were of a passive nature, which demanded the pre-existence of an active desire to find out on the part of the non-members (for example, walking over to a notice board and reading it).

Questions 15 and 20, on the other hand, were designed to examine whether quality circles were seen as a way to derive specific benefits, either for the unit as a whole or for participants. The results gained are available in Tables 36-39 in the Appendix.

Question 15 is again a statement, viz. "The presence of quality circles in a unit makes jobs more secure". This could incite a favourable response from only a minority, the most being 25% in Unit 34 for Run 2, and 31% for Unit 21 in 1984. There was marked disagreement, but a fair proportion abstain, perhaps more so in Run 3 than in Run 2.

The most favourable response overall comes from Unit 21 (19% in 1983 and 31.6% in 1984, agree with the statement). This unit has undoubtedly the most widespread and stable quality circle programme of course, so the fact that they perceive an advantage of this type is a reflection of their familiarity with the quality circle concept.

Another factor to be noted, is the general context of the unit. Unit 22 has faced the most upheaval in terms of redundancy and reorganization of all. It is apparent that attitudes to this

question change over time here. In Run 2, attitudes were fairly evenly spread, but by 1984, when redundancies and new organisation been implemented, the response had become 80% unfavourable.

Since the extent of quality circle activity and unit performance appear to be closely linked, it is a very difficult task to extract which of these is the dominant influence.

Table 37 shows that for two units at least, there was a significant difference between quality circle member opinion and the views of others. Non-participants were far more likely to disagree with the statement that job security results from quality circle activity. Unit 14 provides a good example. In 1984 (Run 3), 69.4% of non-members disagreed or disagreed strongly with the statement, compared with 46.4% of members answering the question. For Unit 21, the picture is similar, with 67.5% of non-members disagreeing while 39% of members actually agreed.

The last question to be considered here is question 20. This comprised a statement "Membership of a quality circle improves chances of promotion" which was also designed to test for the presence of any elitism in the quality circle programme. Tables 38 and 39 show the responses given.

Table 38 shows the extent of agreement with this statement is small. In Run 2, only 3.3% in Units 32 and 14 could agree with the notion, and in 1984, only 2.5% in Unit 22 concurred. This contrasts with 67.5% disagreement in Unit 22 for 1983, and around 70% unfavourable reaction in all units in 1984.

Table 39 shows where differences between quality circle members and others have arisen. For 1983, only unit 14 shows any distinction, centred around a strong disagreement among quality circle members (83.3% either disagree or strongly disagreeing) and

a high proportion of indifference among the rest (42.9% in the middle category). In 1984, three units now show a difference although no overall pattern emerges.

It would seem that there is wholesale rejection of the notion that promotion is linked to quality circles. Certainly, no policy to use quality circle participation as a yard-stick for granting promotion was in use in the company at the time. There was some view that certain skills gained during participation would be beneficial in personal development and could thus aid advancement in the company. This was not formally acknowledged nor proven in practice. It is apparent in any event that such potential advantage has not been noticed on the shop-floor.

Quality Circle Objectives

Aside from the other attitude questions, a separate type of question was designed to find out what respondents felt quality circles aimed to achieve. This was in order to examine the expectations and perceived objectives of quality circles, as well as to determine whether the views of members and non-members were dissimilar, which would suggest something about the impact of quality circle membership on attitudes.

The question was "What do you think quality circles hope to achieve?" and a list of possible objectives given. It was thought prudent to restrict the options in this way, rather than to ask an open question were the respondent chose their own, so as to make meaningful data analysis more probable.

Table 40 shows the results gained from the two data runs. In each case, a rank has been given showing the order of popularity with respondents. The "top three" are identical for both runs and indicate a task priority for quality circles. It is notable that

"solve work problems" is more popular than quality related options, which are suggested in the name "quality circle". Clearly, there is a deep-seated opinion that quality circles exist to get jobs done. The next set of three, ranked 4, 5 and 6, are again the same for both data runs and are task oriented, centred on costs, output and operating procedures, although the ordering does change slightly. The last batch consists of the non-task related areas, concerning job awareness and satisfaction, and improving relationships. These are constantly the least popular, always occupying ranks 7 to 9.

It was also possible to compare the objectives selected by quality circle members and non-members. This revealed that quality circle members were more likely to pick out the non-task objectives than non-participants, looking at the data for Run 3, all taken together, the objective "improves relationships" was selected by 65.2% of members but by only 38.0% of non-members. Similarly, "increase job awareness" was picked by 80.4% of members and 44.6% of non-members.

Run 3 data can be used to show differences between units. It is useful to compare a unit with extensive quality circle experience, 21, with one which has had less regular quality circle activity, 34. Here, the difference between quality circle members and the rest is equally marked. For Unit 21, 81.8% of quality circle members selected "increase job awareness" while only 55.6% of others did the same; for Unit 34, the figures are 64.3% and 55.6%, a closer result. To compare a task-related option, 72.7% of members in Unit 21 chose "improve operating procedures, compared with 52.8%. In Unit 34, 71.4% of members chose it while 66.7% did so who did not belong to a quality circle.

It appears that quality circle experience tends to change views about quality circle objectives. Respondents with extensive quality circle exposure are more likely to pick non-task objectives, than those with limited experience, and members and non-members tend to differ more. Lesser experienced respondents stick to the obvious, task areas and members and non-members have more similar views. This would lead to the supposition that experience of quality circles, most notably as a member, tends to heighten awareness of non-task objectives of quality circles.

6.2.3 Summary

All units differ considerably in the characteristics of the respondents. There was some shift in the survey population over the year, mainly in terms of experience in the job and length of time with the company. This was concentrated more in some units than others, reflecting restructuring in shop-floor personnel.

The majority of respondents expressed positive (or at least neutral) attitudes to work in general, although variations did occur over time. As far as attitudes to quality circles are concerned, most are positive or neutral towards them overall, but little impact on the company is perceived at shop-floor level. Differences in attitudes between quality circle members and others were to be found in certain specific instances, although these differences do not persist over time. It has been discovered that attitude to quality circles and attitude to the job are linked, and that these associations are not influenced by quality circle membership.

Other variables revealed specific attitudes to quality circles. The number who thought a useful change had been introduced to their work area as a result of quality circle activity was surprisingly low, particularly among non-members of quality circles. Management attitudes to quality circles are perceived by the shop-floor to be fairly favourable on the whole, although a large number of respondents did not express a view either way. The issue of feedback from quality circles to their colleagues outside the groups did not generate very satisfactory conclusions. Two questions designed to test this area could not generate consistent answers; this is perhaps an area where further study is required. Looking at potential non-pecuniary rewards to be gained from quality circles, there is little evidence that the shop-floor expected any such gains to result.

Quality circle objectives are perceived as task-related in the main, although a proportion of respondents, mainly quality circle members, do select non-rank objectives for quality circles when given the opportunity.

6.3 The Interviews

There were basically three types of interviews conducted at each unit:

1. With shop-floor employees;
2. With technical staffs and management;
3. With senior management and quality circle facilitators.

Each was approached in a slightly different way and so will be discussed in turn.

6.3.1 Shop-floor employees

These were carried out to provide a check of accuracy and reliability for the questionnaire, and to provide qualitative information to back up the data gained from other sources. They proved to be something of a disappointment, since the amount of data which could be gathered in this way was restricted by organizational problems. Refusal to allow access in some units to shop-floor employees for interviewing purposes has meant an incomplete data set, and an inability to analyse systematically.

Perusal of the interviews which were successfully conducted and some manual analysis led to the conclusion that the objective of checking questionnaire responses was fulfilled. It was also possible to use the data qualitatively to help build up a picture of individual work areas and quality circles. For this reason, the interviews were especially useful to provide a counterbalance of management views, to enable an unbiased view of individual units and quality circle programmes. Some of this qualitative data will be referred to in later discussions of management interviews.

6.3.2. Technical staffs and Managers

Interviews were conducted using the checklists shown in Appendix 5. In total, 20 were interviewed in 1982 as part of the pilot run, 58 were interviewed in Run 2 and 45 in Run 3. The apportionment of these totals between units was done on the basis of unit size and quality circle activity. For example, Unit 32 was the smallest unit and had only a small number of circles - 2 in 1983, when 6 engineers and managers were interviewed, and 1 in 1984 when only 4 were seen. Thus Unit 21 which had the highest level of QC activity also had a concentration of technical and

managerial interviewing, with 18 carried out in 1984. Selection was on the basis of availability and knowledge of quality circle activities.

The checklist was designed to test the hypotheses isolated for testing by interview. These were mainly concerned with the level and quality of management support for quality circles and their attitude towards them (particularly the results they set for them). The interviews also provided the opportunity to glean factual information and build up a background picture for each unit.

The answers derived from the checklists were refined into 5 dimensions of management opinion, listed in Appendix 10. These were dichotomous scales, defined at the outset of the research as key reference points to which the interview data could be fixed. The Appendix contains examples drawn from actual interviews at each end of the scale. Also contained in the interview was a "Key Results Questionnaire" which is discussed in more detail below.

It is proposed, however, to consider the rest of the interview first. The first dimension isolated was named "Task". This was an attempt to distinguish between those who regarded quality circles as a way to get specific jobs done, or whether non-task related objectives were held to be more important (the key results analysis was also worked in here).

The precise definitions of the reference points are given in the Appendix, so they will not be repeated here. The results derived are presented in the Appendix at Table 41. It will be noted that the pilot data has been included here for information. Looking at the data, it can be seen that the task-orientated managers and engineers are in the majority in most instances. It

is interesting to note that the gap between task and non-task is wider in 1984 than for the previous year, suggesting that greater familiarity leads technical staff and managers to favour the work results of quality circles over the less tangible employee-development possibilities. There are two possible explanations - either high quality circle achievement has led to greater emphasis being placed there, or expectations of non-task results not being fulfilled has led to disillusionment with such objectives and a trend towards task oriented. Since the level of quality circle achievement has not been outstanding in most visits, it would lead towards acceptance of the second possibility.

The second dimension is termed "interest" and is a measure of the interest shown by each interviewee in the quality circle concept. The results are shown in Table 42. It can be seen that the managers interviewed were more or less equally divided between low interest and high interest, with few deviations.

"Involvement" was a dimension designed to show the extent to which each individual was involved personally in quality circle activity, either by attending a meeting or a presentation of completed project, or been directly involved in some other way. Table 43 shows that the majority of those interviewed had been involved which is perhaps an indication of the importance of middle managers and engineers in quality circle projects. The most frequently mentioned form of participation was responding to invitations to attend meetings and provide information relevant to a quality circle project. Second came providing material help outside of meetings, for example, arranging for the collection of data or building of prototype models to designs proposed by a quality circle.

In some of the units (notably 22, 21 and 13), it was common practice for an engineer to become a permanent part of a quality circle. This was not believed to be an advisable step by the majority who had been called upon to do it, since they felt it was a departure from the original quality circle concept and meant that their expertise tended to dominate proceedings. This issue is discussed in detail in Section 6.4 where actual meetings are analysed.

The next dimension to be considered has been termed "control". This examines the degree to which managers and technicians see a potential for using quality circles to meet management objectives. Happily, Table 44 shows that few managers see quality circles as a means to serve their own ends. It is significant, however, that the small number who do view quality circles as an element of the management control system, grows year by year. In 1983, only 3 out of 58 express such views, but this has increased to 8 out of 45 a year later. This may be evidence of management observing, or expecting, a successful scheme, that management see good results and so potential to derive extensive benefits (for as rational men, they are unlikely to attempt to make use of the quality circles if they are not anticipating results). It could also be indicative of an integration of quality circle activity into the everyday life of the company - into the management control system. Judging by this evidence, this will be a slow process.

The final aspect to be considered has been named "approval" and represents a final judgement of the overall management opinion. The views expressed by interviewees have been taken in

sum, and each individual has been designated "for" or "against" the quality circle concept. This is a rough "rule of thumb" measure of management approval.

Reference to Table 45 reveals an apparent attitude shift. In 1983, the general vote is in favour of quality circles - by 40 against 18. By 1984, however, the gap has narrowed to 24 in favour and 21 "anti". Of course, this dimension is the most judgemental, being based on the number of positive and negative statements made in each interview. Many factors may influence the way a statement is made, including bad temper, "having a bad day", a recent conflict with some aspect of the quality circle programme which has had only a temporary effect on attitude, hearsay evidence, personal dislike of the quality circle facilitator, in fact many reasons which may influence an individual at one point in time. It must be said, however, that ineffectual or inconsistent management support was frequently mentioned as a block to progress by quality circles in all units.

Key Results Questionnaire

The 1984 data run included three questions designed to extract the objectives which managers and technical staffs supposed quality circles have. It was surmised that these objectives may well form criteria by which individuals were judging quality circle performance. It was decided to try and discover these objectives.

The first stage was to find out what each individual's views were, so the question "What do quality circles achieve?". A whole range of answers was given, which are included in the assessment of task dimension shown in Table 41. This open question was intended to discover the interviewee's ideas before presenting

them with a checklist of specific objectives and asking each individual to rank them in order of "usefulness to the unit". Table 46 shows the results. These have been summarised in Figures 6.1 and 6.2.

The figures show how often each of the 13 objectives on the checklist has been ranked between 1 and 3 (6.1) and between 11 and 13 (6.2). It can be seen that there is wide variety in the answers given. Standard task-related areas such as "cost control" and "quality improvement" are often in the top three (62.2% and 71.1% respectively, of managers put them there). Also appearing frequently in the top rankings are "motivation of work-force" (57.8% of respondents), good relations (53.3%) and training (44.4%).

The most frequent appearance in the bottom three is "targets met", put there by 97.8%. It was frequently mentioned in interviews that quality circle process was slow, and could not respond quickly enough to production demands. Certainly, it is apparent that some circles take many weeks, and sometimes months, reaching a conclusion. Unfortunately, it was not possible to get accurate figures on project duration, since quality circles in some units led a very uneven existence.

Accordingly, another favourite for the lowest rankings was "work pace to schedule" with 40.0%, which would seem to bear this out. Clearly, managers and engineers do not see quality circles as a way to solve problems on a day-to-day basis (which has implications for potential growth paths).

FIGURE 6.1

KEY RESULTS RANK 1 TO 3

PER CENT

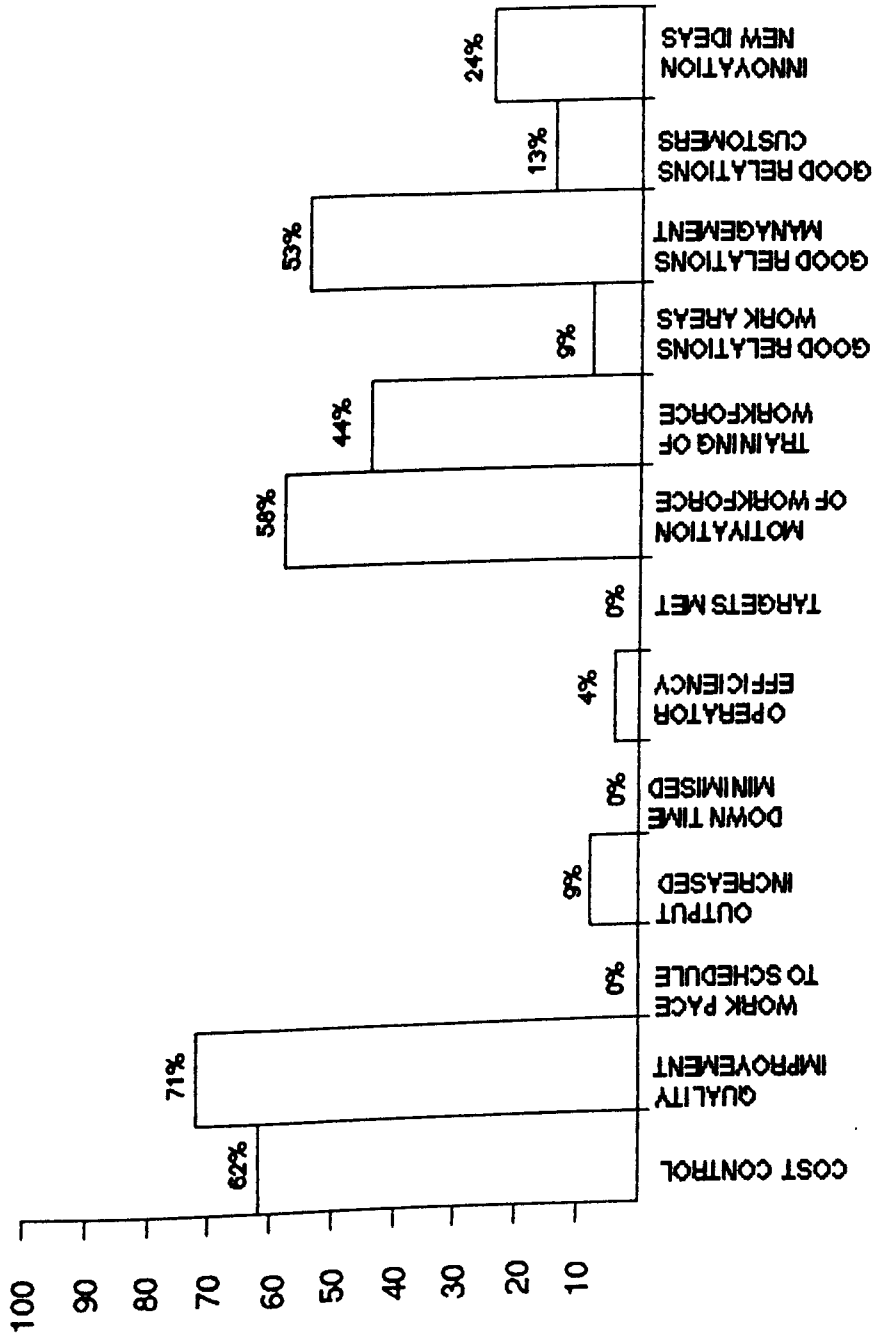
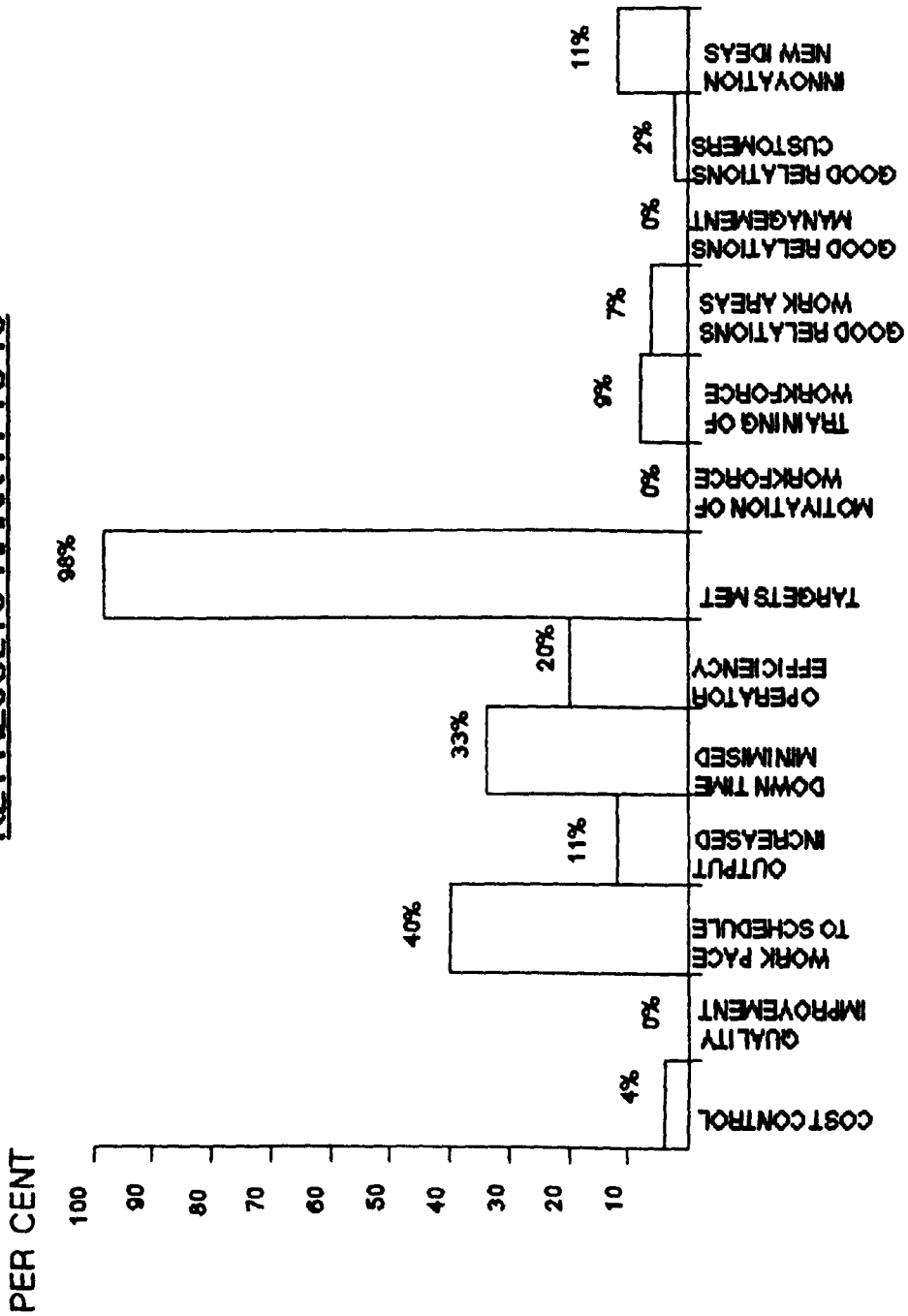


FIGURE 6.2

KEY RESULTS RANK 11 TO 13



6.3.3 Other Interviews

At each unit visited, another series of interviews was carried out. They can be divided into two categories designed to:

1. derive information about the company in general and the unit under study, especially management style;
2. derive information about the quality circle programme.

Obviously there was some overlap between the two, since they cannot be easily kept apart.

In every instance (that is, for all units in both major research runs) the senior management team was interviewed, as far as was possible. Quality circle facilitators, leaders and consultants were also seen for an in-depth interviewing session.

These interviews were largely unstructured, although a brief aide-memoire was used, to take full advantage of the flow of conversation and to elicit more deep-rooted opinions. As a result, the information gleaned from these interviews cannot be analysed quantitatively, but has to be used mainly as impressionistic evidence. The interviews have meant that a detailed picture of unit performance, management style and quality circle performance has been built up and has been a valuable input to the study, even though the data cannot be presented coherently. It has been interwoven into this thesis. The background notes to the units, in particular, have drawn considerably on the interviews.

6.4 Quality Circle Meetings

6.4.1 Methods of Analysis

Quality circle meetings were observed, and interaction recorded using the forms shown in Appendix 7. Chapter 5 describes the way in which these forms were drawn up and the methods used to ensure the data recorded was of an appropriate accuracy.

The observation checklists when completed after a meeting were transcribed into a computer compatible format and input to the mainframe computer. A specially designed software package was applied to analyse the data and produce graph plots which showed the pattern of interaction at each meeting.

Five different types of analysis were carried out to generate different plots. Appendix 11 contains examples of these.

Types of Analysis

1. Pattern of interaction for whole group. This tabulates the amount of interaction in each of the thirteen main categories on the observation schedule, in each case expressed as a percentage of total interaction.
2. Pattern of interaction for individuals. This isolates the interaction of individual members of a group, the identity of these members depending on the circumstances of each meeting. As with type (1), this shows the percentage of total interaction for that individual, in each category, and then compares it with the interaction for the whole group, superimposed on the graph (with a dotted line).
3. Pattern of interaction over time. This third style of graph plots interaction over time, to show how total interaction varies over the course of each meeting. Plots are shown for the whole group and for individual members, as required.

4. Pattern of interaction over time by category. The percentage of total interaction in each category is shown over time, to see if different types of interaction always occur at similar points in a meeting. A separate plot is shown for each category of interaction. This type of plot shows interaction for the whole group.
5. Pattern of interaction over time by category. This graph is identical to (4) above, except that it shows the interaction of a selected member of the group.

Obviously, a large number of plots were generated in this way, too many to show in this thesis. Instead it is proposed to present the conclusions drawn from the scrutiny of all the plots and to show examples in the Appendix to demonstrate how these conclusions were reached. Unfortunately, these plots tend to originate to a large degree from Unit 21. This is difficult to avoid when the bulk of quality circles and thus of meetings attended, originated there. Appendix 7 shows that 41 out of 79 meetings attended were at Unit 21.

Analyses types (4) and (5) are not always successful. They have tended to result in a bunching of information not easily untangled. It has been decided, therefore, to include these particular figures only where these reveal anything significant.

6.4.2 The Findings

The plots derived from the analyses described above can be drawn into various categories, depending on the circumstances of the individual meetings concerned. It is intended in this section to discuss different circumstances and to describe the impact meeting structure has on interaction in each case, for example, a clerical and an engineering circle are included, a meeting where a

guest attends, a meeting with rival leaders or with the facilitator present. It is unfortunate that space does not permit inclusion of more of these plots, since they are revealing about quality circle effectiveness. Concentration on interaction analysis of this sort would be a fruitful emphasis for a subsequent study.

To begin with, however, it is proposed to show a "typical" quality circle meeting of a group who were able to work together successfully.

1. A "typical" quality circle meeting

A "typical" meeting in this sense is not intended to imply that this quality circle is average or fully representative of the other circles under study; every group operates in a different way. The purpose of this section is to show meetings where there were no special circumstances, in order to provide a frame of reference for the rest which follow.

Two meetings are in fact presented. The first meeting (Figure 11.1) took place on 24.3.82 at Unit 21 and was a preparation for a forthcoming management presentation, where a completed project was to be submitted for management approval. The group consisted of 8 participants, and lasted for 55 minutes. A flipchart was used during the meeting and group-generated material was referred to. The designated quality circle leader fulfilled the role of task, process and felt leader, with his task role dominant in this meeting.

Reference to Figure 11.1 reveals the pattern of interaction during the meeting. It can be seen that "supporting/listening" was the dominant category here, followed by "giving information". Proposing behaviour also comes to the fore. This suggests an

interchange of ideas about the way the presentation should be organised. Figure 11.2 shows the leader's hand in this interaction. The majority of his interaction is in the fields of "proposing", "giving information" and "seeking information" which suggests his prominent role in the task discussion. This process leadership also stands out, since he dominates "testing understanding", "summarising" and "bringing in" all an intrinsic part of guiding and controlling a group discussion.

Figure 11.3 shows the dispersal of group interaction over time. A high percentage of total interaction indicates frequent, short interactions occurring in each time period - that is, many people speaking for short periods. Lower percentages point to longer individual interactions - for example, one person speaking for several minutes. The figure shows that the amount of interaction follows a series of peaks and troughs throughout the 55 minute meeting. The interaction of group and leader follow each other, but at the end of the meeting the leader lessens his participation in the proceedings, whilst that of the rest of the group actually increases.

The reasons behind this can be gleaned from Figures 11.4 and 11.5, showing interaction over time broken down, into categories. Figure 11.4 shows the analysis for the whole group and reveals a sharp rise in the incidence of joking behaviour in the last five minutes of the meeting, in which the leader does not participate (as seen in Figure 11.5).

A second meeting of the same quality circle was recorded on 16.3.83, on this occasion lasting a full hour. This meeting represented a brainstorming session, aimed at finding ideas for

the next project. Since brainstorming is an archetypal part of the quality circle phenomenon, the interaction from this meeting has been included to show how it affects group process.

It can be seen from Figure 11.6 that the majority of interaction in this meeting was the giving and receiving of information. The amount of proposing and building behaviours is considerably less than in the previous meeting. The number of questions asked is also correspondingly low.

Figure 11.8 shows that the peak of activity occurred when the meeting was fifteen to twenty minutes old, which no doubt represents the concentration of brainstorming activity. Figure 11.9 shows that this peak of activity comprised information exchange. The leader's behaviour was more constant throughout the meeting, although it peaked at the end of the hour.

These two meetings show the types of interaction which largely form the substance of a quality circle meeting. Giving information, listening and asking questions are dominant. The leader in this group is predominantly a task leader, judging by his pattern of interaction, where information sharing comes to the fore. He does indulge in the majority of leader behaviours (i.e. "building", "summarising", "proposing"), but these do not constitute the bulk of his participation.

2. A clerical quality circle

The circle described above consisted of production employees. The next to be discussed is a quality circle established in the accounts department of the same unit. This is a smaller group of 5 members who were meeting to discuss the outcome of a leaders'

meeting attended by their own quality circle leader. It may be possible that a clerical quality circle would display a different pattern of interaction to that of a production group.

Examination of Figures 11.10-11.12 reveals, however, that there is little evidence here to support that view, and in fact a very similar pattern emerges. Although the meeting comprised a session of information-sharing and feedback from the leader, he still does not represent the major part of the interaction.

3. An engineering quality circle

Having discerned little difference between a shop-floor group and a clerical group, it is worthwhile looking at a group made up entirely of engineers, to see if this shows a different pattern again.

Figure 11.13 shows the basic pattern of interaction. Striking here is the wide discrepancy between "giving information" and "supporting/listening". In other words, more people were talking than listening! This was certainly a more heated discussion with a relatively high incidence of disagreement and objections raised. Although some of this difference can be put down to individual characteristics, it was noted in other engineering groups that interaction was more conflict-ridden than in shop-floor groups, possibly because group members were more used to discussing work-related problems and had clear-cut ideas about issues which they were confident about expressing.

The leader in this meeting takes a less than prominent role in most things as his interaction is far behind the rest (11.14 and 11.15), although he does partake in some process leadership activities.

The pattern of interaction over time is not very revealing, since many categories differ hardly at all and are impossible to distinguish clearly from analysis.

Having considered different types of groups, it is worth reviewing evidence where individual members are differentiated from the rest.

4. An engineer member

Engineers as permanent or semi-permanent additions to quality circles, were a feature in several units' quality circle programmes. Unit 14 used engineers as leaders of quality circles and Unit 22 developed a series of "consultants". Originally intended to assist circles, where required, they often ended up as leaders. On occasions, however, engineers became full-time members of circles in areas where engineer involvement was a feature of everyday work. It would be anticipated that their superior expertise and wider product knowledge would lead them to dominate task discussion, to the detriment of other members.

Reference to Figures 11.16-11.19 shows that the engineer's participation is in fact at the expense of the quality circle leader.

The pattern of interaction relates to a group meeting in Unit 21, in an area producing a highly technical product. Many of the group members are in fact of technician standing. The pattern of interaction in Figure 11.16 is fairly typical, but with an above-average incidence of disagreement. Figure 11.17 and 11.18 show that the interaction of the engineer outstrips that of the leader. The meeting centred on an analysis of a previous brainstorming exercise, so it is not the content of the meeting

that is causing the imbalance. The engineer in fact initiates the process leadership, taking the lead in "proposing", "summarising" and "bringing in".

Figure 11.19 also shows the engineer as the extant leader of the group. The formally designated leader's interaction follows that of the engineer member who mirrors the rest of the group quite closely.

5. An active member

A similar instance of an influential member can be seen from a meeting in Unit 32. At this meeting, only 4 out of the 6 members of the quality circle were present, which resulted in a large proportion of interaction being dominated by a particular member. Figures 11.20 and 11.21 show the patterns of interaction, and that this individual plays a significant role in nearly all the categories of interaction. In many she plays a more important role than the actual leader, notably in making proposals and asking questions.

This meeting actually has a break in it (see Figure 11.23). This is where the discussion actually centred around this research programme, so interaction could not be recorded. The marked pattern of interaction over time in this instance is caused by the entrance and exit of the facilitator who came into the meeting for short periods on two occasions and brought materials for the group.

The last two meetings to be considered concern the influence of people from outside the group on meeting behaviour. The first instance is where the facilitator attends the meeting.

6. The presence of the facilitator

The presence of the quality circle facilitator at a quality circle meeting is usually indicative of problems of some sort. In this case, a quality circle in Unit 14 was having difficulty making consistent progress and had requested the facilitator's presence to help restore group confidence.

The facilitator, when present, unavoidably takes over the leadership of the group. It is perhaps inevitable since he is designated the "leader" of the quality circle programme itself. In this meeting, the leader became in effect an ordinary member, so his individual impact on proceedings has not been presented as separate issue.

The facilitator's interaction pattern is very similar to those of the quality circle leaders already mentioned. It can be seen in Figure 11.25. Task contribution is fairly low, but process leadership characteristics are evident.

7. The presence of a guest

Most quality circles invite guests to their meeting at some point, either for advice, to test the possible reaction to a proposed solution or to inform and involve interested parties. Examination of the interaction from meetings where guests were present generates the conclusion that interaction is not affected in any great sense.

Figures 11.27 to 11.30 show an instance where a guest has attended a meeting, which demonstrates this. The meeting took place at Unit 21 on 16.3.84 and involved a group of skilled metal machinists, engaged in the manufacture of pieceparts (one of four

quality circles in this work area). The guest was a tooling engineer invited to give his opinions of a solution to a problem proposed by the quality circle.

Figure 11.27 shows a typical interaction pattern for a circle meeting, with a larger than usual "open/joking" category. This was always a fairly lively quality circle and much humorous exchange was a common feature. Figure 11.29 shows the interaction pattern of the guest, quite low because he did not arrive at the beginning of the meeting this pattern of interaction is consistent with expectations, centred around the exchange of information. He takes no part in any leadership functions, unlike permanent engineer members. Figure 11.30 shows that the guest's interaction pattern is independent of both group and leader, and is fairly smooth over the period of time he is present at the meeting.

6.4.3 Summary

This section has discussed some of the features of group process in quality circles. It has shown the patterns of interaction are fairly consistent between different quality circles, but that engineering groups tend to work slightly differently. Certain parties influence quality circle interaction, the facilitator or an engineer member, but guests do not. Quality circle leaders interaction patterns over time follow a different course to that of the rest of the group.

CHAPTER 7 - CONCLUSIONS

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CHAPTER 7

CONCLUSIONS

7.1 Introduction

This final chapter contains the conclusions that have been reached at the end of the research programme. They are divided into two, the first section relates specifically to hypotheses and the second group do not, but have been reached as a result of the exposure to quality circles gained over the three years. This second set are obviously more tentative.

If a hypothesis from the list in Appendix 3 is not included in this final chapter, then it can be assumed that insufficient data was gathered to make any kind of judgement.

Many of the conclusions have been negative to some degree. This is not a regrettable outcome, since it goes towards putting quality circles into clearer perspective. Any conclusions that can be reached about quality circles will represent an advance in the knowledge of their operation in a Western context.

Finally, there are some suggestions for further work which can follow on from this research programme.

7.2 Conclusions Relating to the Hypotheses

These have been split into two sections, those where hypotheses have been proved and those where they have not. The references at the end of each statement are to the number of the hypotheses the conclusion relates to in Appendix 3. These

conclusions have been kept necessarily brief. They are a culmination of the lengthy discussions which have gone before them.

7.2.1 Hypotheses Proven

1. Quality circles are vulnerable to instability in unit performance.

In five out of six of the units studied, major restructuring had taken place either just before the study began, or during its course. In two out of five cases, this had severe constraining effects on the quality circle programme (Units 12 and 21). Units which were able to sustain some form of quality circle activity through upheaval - 14, 32 and 34, were able to maintain some degree of coherence in their quality circle programmes.

2. Quality circles have not been integrated fully into the management control system.

Only one unit in the study had made any sort of financial provision for quality circle activity, although this provision was very small (an expenses budget in effect). No formal accountability had been established. Quality circle activity operated in a vacuum, relying on the goodwill of management and engineering to succeed. No monitoring of task work was carried out, so the effectiveness of quality circle implemented solutions is not known. Any remedial work required when a solution does not work in practice is carried out by engineering to whom this is an extra burden of work.

Quality circle work is an extra item for management and engineering. It does not form part of their job description and they are given no additional time resource to deal with it correspondingly.

3. Management and engineering support for quality circles is insufficient to allow them to function optimally.

Senior managers support quality circles, but do not give their subordinates the resource provision to do the same. This has represented a hindrance to quality circle effectiveness. Shop-floor opinion has not perceived this, but many instances have been uncovered where blocks on progress have been uncovered (see, for example, Chapter 1 in the background to Unit 32).

4. Management do not monitor quality circle performance and have not established common criteria for success.

Management are able to rank criteria for success ("key results") in a consistent way, but do not apply them in any real sense.

5. Quality circle members are committed to the quality circle concept.

In most cases, quality circle members are more positive about the concept than non-participants. Instances where this is not so have experienced patchy quality circle performances (for example, Unit 22 in 1984).

6. Quality circle members are volunteers.

7. Non-member reaction to the quality circle is apathetic or supportive.

Analysis of questionnaire responses reveals little hostility to the quality circle idea.

8. Level of achievement of quality circles, as perceived by members, is an important determinant of continued quality circle participation.

The most frequent dissatisfaction expressed in interviews with quality circle members and leaders was lack of achievement and difficulty in finding satisfying projects.

9. The leader is essential to quality circle progress.

The quality circle role proved to be a key one in a successful programme. Quality circle participation required a lot of extra work for these people in terms of conducting circle business outside meeting hours. Lack of enthusiasm for circle activity on the part of the leader was a sure indication of a circle's demise, at least in the short-run. The most stable and frequently achieving quality circles maintained continuity in leadership throughout the entire study.

10. The rate and quality of quality circle task work is essential to quality circle performance.

11. There appears to be a link between skill levels and quality circle momentum.

Units with a greater proportion of high skill workers (Units 21 and 34, for instance) tend to have more effective quality circles. It is not possible to reach conclusions about the skill composition of individual quality circles.

12. The role of the facilitator is key to quality circle momentum and existence.

The facilitator is such an intrinsic part of the quality circle programme that it could not exist without him.

13. Quality circles work as effective groups.

Scrutiny of the group process observation data reveals a consistent pattern of interaction among groups. Problems are generally localised and concern individual personalities in the main. Quality circles in this study have not folded solely because they cannot work together as a group.

7.2.2 Hypotheses not proven

1. The impact of the unit manager on quality circle performance is unproven.

Frequent changes of unit managers over the course of the study made it impossible to gauge the effect of the management style of the unit manager on the quality circles. There is no evidence that unit managers set "key results" for quality circles or monitor them in any way.

2. The impact of the formal organization on quality circles cannot be judged.

Constant change in many of the units made it impossible to gather enough information about the formal organisation. An abrasive relationship between operations and engineering was observed to have a detrimental effect on quality circle performance.

3. It is clear that it is not the changes in task work, in shop-floor attitudes which influence quality circle success. Unit 34 has been able to maintain a programme through rapid technological change and fluctuations in staff numbers. Units who have allowed quality circle activity to die in the same conditions (that is, Units 13 and 22) have not been able to revive programmes successfully.

4. There is no evidence that quality circle participation changes attitudes to work.

No consistent relation was discovered in analyzing the questionnaire that attitudes to work and quality circle membership are related.

5. There is no evidence that attitudes to work influence attitudes to quality circles, nor determine the decision to participate.

6. Quality circles are perceived as part of the everyday work of the Company.

Quality circles are perceived in this way by quality circle members only. Management and engineering on the whole do not support this view.

7. There is no evidence of any impact on quality circle programmes of any other management tools.

Observation of other management tools was minimal. Their existence was not mentioned in any interview with a quality circle participant.

8. It is not proven that the quality circle leader must always assume task, felt or process leadership in order to ensure effective functioning of the group.

These leadership tasks may well be key to the success of a quality circle, but they have been observed to be carried out by other group members. There is no evidence to suggest this is advantageous or disadvantageous to quality circle performance.

9. This study has thrown no light on the relationship between the quality of interaction within the circle and the quality of interaction in everyday work.

10. It is therefore impossible to judge whether the work area supervisor is the most suitable person to act as circle leader.
11. Use of prescribed techniques has not been shown to have any influence on quality circle performance.

The prescribed techniques are not in constant use; they are not designed for use at every meeting. Spasmodic observation therefore, in two week bursts, cannot provide enough information about the use of techniques to arrive at firm conclusions about the link with quality circle effectiveness. What has emerged, however, is that only a limited range of techniques are in use. It is also the case that the quality circles themselves do not monitor their performance and so cannot provide information themselves to help judge this issue.

12. There has been little opportunity to observe the development of quality circles over time. It is therefore impossible to reach any conclusions about quality circle evolution.

The sporadic nature of quality circle activity has not permitted any occasion to observe quality circle growth over time. Some quality circles in Unit 21 have begun to develop the maturity required to evolve, but this has been over a 4- or 5-year period. Growth that has taken place has taken the form of consolidation of a group's existence and the removal of barriers on their own initiative, rather than moving into new realms of operation, although signs are showing that this has begun to happen. This leads to a further conclusion that

quality circles need a long period of time in which to mature and grow. This is after a minimum period of 4 years, assuming constant and stable performance.

7.3 Other Conclusions

1. There is no evidence from this study that quality circles make any perceivable impact on their organization in terms of the task work they perform. There is no evidence to suggest they are sharing any of the burden of work related problem-solving from engineering, rather they are looking at a range of problems which engineering would not usually tend to. This could be because they have been previously considered, but written off as not cost effective, not regarded as pressing enough to justify a place on a loaded work schedule, or have not been considered for other reasons, for example, because the product in question is due to be phased out. This information is not usually available to quality circles.
2. The situation described above does not help quality circles' credibility with sceptical engineers. A quality circle which chooses a problem area previously rejected by engineering and then goes to them for technical help, the response from engineering is often less than constructive. This is inevitable when no formal time provision is given to engineering.
3. Participants in quality circles are not given appropriate training if a standard UK model of quality circles is in use (see Chapter 2). Below are some examples of neglected areas.

Shop-floor staff are not used to communicating on an equal footing with management and sometimes find this a disadvantage. Public speaking is often required and is not easy for many - even talking in a group can be an ordeal. Product awareness could also be improved to equip shop-floor staff with a better understanding of their work and help them select appropriate topics.

Engineering are often less than skillful in communicating. Quality circles require a realignment of technical staffs' attitudes to the shop-floor at times - it may not be easy for an engineer to speak of technical matters to a less qualified person and find the correct level. Engineering are too often ignorant of the structure of and company aims for the quality circle programme in the unit.

Management are also often less than aware of the objectives of quality circles, for not all respond to them. They also underrate the importance of evaluation of quality circle achievements and of building-in adequate provision to the management control system.

4. It is not necessary to associate rewards with quality circle activity, as they can function adequately without them. The philosophy of quality circles is in part that it enables the shop-floor to make a contribution to company objectives in a different and more fulfilling way than the usual employment relationship permits. If the resources released by quality circle achievements (for example, if they can cut scrap rates) are devoted back to the quality circles as tangible reward, then this has defeated the original objective. To reward participation with a bonus, or overtime or whatever,

merely extends the Western contractual wage bargain. Quality circles are part of the Japanese "team work" philosophy and their success observed there must be tied in with this. To remove this element of the quality circle programme must surely threaten its ability to bring about desired objectives.

5. This leads on to the next conclusion: that quality circles cannot achieve their desired objectives if they are isolated from their original context. Quality circles are unlikely to have the desired motivational effect if they are bound by any existing unitarist ideology.
6. It is not proven that quality circles have the power to motivate and change attitudes (except towards themselves). The standard ideology is that quality circles create a great sense of involvement in the job and so motivate the individual towards company objectives and improve individual performance. It is equally plausible that in any organisation lies a reservoir of employees already favourably disposed towards company objectives, who find an outlet for their positive attitudes through the quality circle programme. As participation in circles is voluntary, this reinforces this argument, since anyone not already reasonably positive about their work are unlikely to volunteer. Some may volunteer who do not hold total commitment to company goals but the number doing so must be very small and there must be more cost effective ways to motivate this minority.

7.4 Suggestions for Further Work

It is necessary for more information to be generated about quality circles in action, looking at other companies in the electronics sector and at other industries. There are a number of areas which could lend themselves to profitable research.

1. Comparable information about attitudes and possible shifts in attitudes, hopefully in an industry enjoying some stability at present (if that is possible in current economic conditions).
2. Information to help solve the "causation puzzle", that is, do quality circles motivate people or do they merely tap an unused resource of enthusiasm for company objectives?
3. Study of mature quality circle programmes to discover more about quality circle evolution and growth paths.
4. Information about the most effective composition of quality circles themselves, particularly in relation to their achievement levels.
5. The issue of management evaluation of quality circles and criteria for success.
6. The appropriateness of rewards for quality circle activities; a case study of a company offering rewards would be revealing.

APPENDICES

APPENDIX 1
RESEARCH STRATEGY

APPENDIX 1
RESEACH STRATEGY

AIMS

1. To review the experience of Quality Circles and to record and evaluate what has been learned from it.

2. (a) To discover the factors which determine the performance of
 - (i) the individual Quality Circle member, and
 - (ii) the Quality Circle as a "work group".(b) To identify those factors which are the seeds of success or failure of Quality Circles including the attitudes of Quality Circle members.

3. (a) To project the future of Quality Circles on the basis of trends.
(b) To set out the requisite role, conditions and strategies for effective future performance of Quality Circles.

APPENDIX 2

THE SURVEY POPULATION

APPENDIX 2

THE SURVEY POPULATION

All company units have been encoded according to their location and product group. These codes have been used to refer to the units selected for study. The reference consists of two digits, the first representing location and the second product group. The six units covered three manufacturing locations (Harlow, Essex = 1; Paignton, Devon = 2; Great Yarmouth, Norfolk = 3) and four product groups. Thus it is possible to consider at all times the effect of these two variables on the data collected.

The two units at Yarmouth (32 and 34) were initially considered separately. They are both fairly small, however, and it became apparent that the product group had minimal bearing on unit performance, in this instance. It has therefore been decided to amalgamate these two into one for certain purposes.

This has been done in Table 1 overleaf, which shows the number of employees included in the study at the beginning of the second research run. The figures were collected in the autumn of 1982 and, although subject to change over the period studied, give an indication of relative unit size and the breakdown of hourly paid and monthly paid staff. This shows the rough proportion of technical and managerial staffs to direct production operatives.

Table 2 is a summary of the quality circles running during the research programme at the time each run is carried out, and the numbers directly involved. These are useful to compare the extent of participation in each unit over time. A particularly striking feature is the apparent decrease in quality circle size.

In all cases, the number of quality circles has increased, but there has been no corresponding rise in the number of members. Over the three years of the study, 41 circles have been in existence altogether but, as Table 2 shows, not all at the same time.

TABLE 1**NUMBER OF EMPLOYEES (31.10.82)**

Unit	Hourly Paid	Monthly Paid	Total
32 and 34	225	225	450
21	330	120	450
22	450	170	620
13	400	100	500
14	320	100	420
Total	1725	715	2540

TABLE 2**NUMBER OF QUALITY CIRCLES AND MEMBERS**

Unit	Number of Quality Circles			Number of Quality Circle Members		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
34		2	4		16	22
32		2	1		14	6
21	13	12	16	103	88	99
22		9	7		75	44
13		1	-		12	~
14		4	7		36	40
Totals	13	30	35	103	241	211
Average Circle Size				7.9	8.0	6.0

APPENDIX 3

THE HYPOTHESES

APPENDIX 3
PREMISES AND HYPOTHESES

SECTION I - Organizational Climate

- A. The personal approach and individual management style of the unit manager
1. The individual management style and personal approach of the unit manager will affect the way in which quality circles in his work area
 - (i) develop;
 - (ii) perform.
 2. A unit manager whose conception of quality circles extends beyond formal problem-solving will inspire quality circles which fulfill this wider function.
 3. A unit manager who recognizes the importance of communication will adopt a more positive attitude to quality circles than one who does not.
 4. A positive and sustained commitment to quality circles by the unit manager induces a positive attitude among his subordinates.
 5. The degree of commitment to quality circles held by the unit manager will generate a corresponding level of enthusiasm for the QC project among his subordinates.
 6. An enthusiastic response to quality circles by the unit manager promotes their success within the unit.
 7. The management style preferred by the unit manager will be perceived differently by personnel,
 - (i) at different levels in the organization;
 - (ii) with differing lengths of service in the company.
 8. The attitudes of employees to their work are in part conditioned by the personal approach and management style of the unit manager. The preferred management style of the unit manager can be classified thus:
 - exploitative - authoritative;
 - benevolent - authoritative;
 - consultative;
 - participative group.

9. The unit manager will prefer to vary his management style from time to time. This will have an adverse effect on the
 - (i) development;
 - (ii) performanceof quality circles in his work area.
10. The appointment of a new unit manager with a different management style will change the way quality circles in his work area continue to
 - (i) develop;
 - (ii) perform.
11. The commitment of the unit manager to quality circles will be influenced by the key results he sets/are set for him (see "Key Results Checklist").

B The formal organization

1. The personal approach of each manager (as expressed in his concern for key results) will affect the way quality circles in his work area
 - (i) develop;
 - (ii) perform.
2. The division of roles into "line" and "staff" will determine the way in which working relationships develop.
3. The nature of these working relationships will affect the way in which quality circles
 - (i) develop;
 - (ii) perform.

C The informal organization

1. A network of informal relationships will develop and these will affect the way in which quality circles
 - (i) develop;
 - (ii) perform.

D The recent performance of the unit and its repercussions

1. Changes in the nature of task work lead to changes in the effectiveness of quality circles.
2. A change in the number or volume or both of products will lead to a change in the number of problems a quality circle can tackle:

- (i) fewer products or lower volume means fewer available problems and so loss of momentum;
 - (ii) a larger number or greater volume of products means more problems to solve and a greater potential for achievement satisfaction. This will strengthen the desire to participate.
3. Changes in the nature of task work leads to changes of attitudes in those carrying it out.
 4. Changes in the nature of task work will affect the degree to which those carrying it out feel involved in their work.
 5. 1 to 4 above will lead to changes in the way quality circles in a work area:
 - (i) develop;
 - (ii) perform.
 6. Quality circles are a phenomenon that works under conditions of success, as perceived by operators, staffs and managers.
 7. Perceptions of recent success/failure will affect attitudes to quality circles.
 8. Loss of personnel in a work domain induces a change in the degree of cohesion felt by those remaining.
 9. An increase in personnel in the work domain induces a change in the degree of cohesion felt by those remaining:
 10. A change in the level of cohesion in the work domain will affect the way in which quality circles in the area:
 - (i) develop;
 - (ii) perform.
 11. In the fact of significant redundancies, the motivation to participate in quality circles will:
 - (i) increase, or
 - (ii) decrease.
 12. Redundancies will affect quality circle membership:
 - (i) A smaller work-force will mean smaller or fewer circles.
 - (ii) A loss of quality circle members, especially key members, will lead to:
 - demoralisation replacing enthusiasm;
 - a loss of momentum;
 - the circle folding;
 - the scheme failing altogether.

13. An increase in the rate of labour turnover will induce a loss of cohesion and a corresponding loss of quality circle effectiveness.

E Morale in the unit generally

1. When morale is poor, quality circles will not be a success.
2. Quality circles help boost morale.
3. Quality circles improve awareness of what is happening:
 - in the company as a whole;
 - in other factories and locations or both;
 - in other work domains.

SECTION II - Differences

Differences in any of the factors mentioned above will be causally related (determined by or determining) to differences in quality circle performance:

- between units;
- between shops.

SECTION III - Individual Perceptions of Quality Circles

A The individual and the job

1. Support of the quality circle programme is consistent with the formal role in the company.
2. Quality circle involvement helps individuals to identify their role in the company and their working relationships, and to review them in the light of their involvement.
3. There is a relationship between the degree of fit of the individual to his task and his attitude to quality circles:
 - (1) if the individual does not feel up to his job:
 - (a) he will feel inadequate at work; participation in a successful quality circle will give him achievement satisfaction which will compensate for this feeling of inadequacy;
 - (b) he will volunteer for a quality circle if it is presented as a way of participating;
 - (c) he will have a negative attitude to work and thus to quality circles;

- (d) he will feel that quality circle work is beyond him, too;
 - (ii) if the individual feels well fitted to his job:
 - (a) he will feel content at work and will therefore be receptive to quality circles;
 - (b) he will feel there is no room for improvement and will adopt a neutral attitude to circles;
 - (iii) if the individual feel he is capable of more than his job demands:
 - (a) he will feel frustrated; quality circles will be a way for him to use his skills more fully and achieve results;
 - (b) he will develop a negative attitude to work and therefore to the QC programme.
4. Quality circle involvement changes individuals' perception of their job and of quality circles.
5. Quality circles are perceived as part of the everyday working life of the company:
- (i) quality circle members need no additional pecuniary incentives to participate;
There is conflict with the pecuniary rewards offered for ideas submitted to the suggestion scheme;
 - (ii) members are not motivated by the prospect of the non-pecuniary rewards to be gained from membership. (See 12(ii) below).
 - (iii) engineers and other staffs are prepared to give the circles maximum technical support and allow the circles to consult with them freely;
 - (iv) all managers are prepared to give the circles unqualified and overt support and approval;
 - (v) the quality circles are allocated adequate resources to function properly and are subject to the normal budgeting and accounting procedures;
 - (vi) participants in quality circles are not prepared to allow the circle to obstruct the production activities in the work area;

- (vii) non-members in the work domain do not perceive the circles as a way for members to avoid work or to seek rewards. They do not see the circles as detrimental to the area's work effort;
 - (viii) quality circles are not perceived as part of a short-lived quality campaign.
6. Quality circles are not perceived as part of the everyday working life of a company:
- (i) quality circle members need extra pecuniary incentives to participate.
There is conflict with the pecuniary rewards offered under the suggestion scheme in the sense that members believe that QC generated ideas should be eligible for submission.
 - (ii) trade unions will be motivated to intervene to negotiate the rewards for quality circle membership;
 - (iii) members will be motivated by the non-pecuniary benefits to be derived from quality circles:
 - learning new skills;
 - using skills more fully;
 - achievement satisfaction to be gained from the use of skills;
 - involvement;
 - status;
 - felt/approval/recognition of managers.
 - (iv) engineers and staffs will feel the circles represent an intrusion in the work domain.
 - (v) some managers will regard quality circles as detrimental to the production effort of the area and so will not openly encourage them;
 - (vi) in times of stringent budgeting, quality circles are deprived of resources to a greater extent than are other areas. This will be to a degree that prevents the circles from functioning effectively;
 - (vii) circle members spend a disproportionate amount of time on quality circle work so that production suffers;

- (viii) there is insufficient time built into work schedules to allow circles to meet regularly or for meetings of adequate length;
 - (ix) non-members in the work domain see circle meetings as a way for members to avoid work or to seek reward. They are resentful of production time "wasted" in circle meetings;
 - (x) quality circles are perceived as part of a short-lived quality campaign.
7. Quality circle membership is consistent with trade union membership.
 8. Since quality circles do not discuss areas of primary interest to the on-site trade union officials, they do not oppose the quality circle programme.
 9. Perceptions of quality circles among operators and supervisors will be coloured by perceptions of the attitudes of the on-site trade union officials to the programme.
 10. Quality circles add to the productive power of the unit rather than redistributing power from management to QCs.
 11. Those holding positions of power in the organization support quality circles, since they do not represent any significant redistribution of power towards quality circles, but improves management's ability to achieve results.
 12. The extent to which quality circle preferred solutions are acted upon by management is a measure of their power.

B Individual involvement in quality circles

1. All those involved in quality circles are so out of choice. This will promote the effective
 - (i) development;
 - (ii) performanceof quality circles.
2. Those involved in quality circles are so because they are directed. This will be adverse to the effective
 - (i) development;
 - (ii) performanceof quality circles.

3. Non-members in a work area fall into 5 categories:
 - (i) those who are enthusiastic/committed, form potential membership in future;
 - (ii) those who like the idea, but "it's not for me";
 - (iii) those who are indifferent or apathetic;
 - (iv) those who do not like the idea but who are willing to tolerate it;
 - (v) those who are openly hostile and seek to undermine the project.
4. There will be some members who will leave the circle.
5. The number that decides to quit is sufficiently large to cut the size of circles to an extent that renders them ineffective.
6. The number that decides to quit will not threaten the effectiveness of the circles.
7. There will be a number of reasons why some will not join a quality circle. Some of these reasons will affect the potential to expand the quality circle project in future; others will mean that by tackling some of these issues, the company can induce more people to participate in circles, if this is its aim.
8. The frequency and level of achievement of quality circles as perceived by the individual will determine the motivation to participate.
9. There is evidence of a positive attitude to quality circles at all levels. This will contribute to the successful
 - (i) development;
 - (ii) performance of quality circles.
10. This positive attitude will mean support for quality circles at all levels
 - (i) Operator support for circles will take 2 forms:
 - (a) they will join a circle;
 - (b) they will not join but they will tolerate the circles' presence.
 - (ii) Supervisor support for quality circles will take the following forms:
 - (a) they will volunteer to lead a circle;

- (b) they will be prepared to make adequate time provision for circle meetings;
 - (c) they will attempt to secure and maintain non-member cooperation or tolerance;
 - (d) they will use their influence to ensure members obtain support from managers and staff.
- (iii) Staff support for quality circles will take the following forms:
- (a) they will be prepared to give the circles maximum possible technical/specialist back-up and advice;
 - (b) they will be prepared to ensure their support and approval is communicated to the circles;
 - (c) some will be prepared to become members of circles themselves;
 - (d) they will endeavour to implement QC solutions to problems.
- (iv) Management support for quality circles will take the following forms:
- (a) they will be prepared to ensure there are adequate resources at all times to enable the circles to function effectively;
 - (b) they will be prepared to attend management presentations, if invited;
 - (c) they will ensure their support and approval is communicated to the circles;
 - (d) they will be prepared to implement QC recommendations, if possible, and if not to give adequate explanation.

SECTION IV - Relationship to Other Management Tools

1. There are other methods of involvement in operation in the work place.
2. Their existence will lead to ambiguity in the minds of quality circle members as to their role, and this will hinder QC effectiveness.
3. Their existence is perceived as complementary to QCs and this will promote QC effectiveness.

SECTION V - Quality Circles in Operation

This will have 2 aspects:

- (i) prior to research period;
- (ii) during research period.

A The role of the circle leader

1. The leader is essential to quality circle

- (i) development;
- (ii) performance.

2. The leader is essential to quality circle progress because he takes on the role of group process leader for the circle. This has a number of aspects.

- (i) He ensures that the group convenes:
 - (a) he will allocate production time for a regular meeting in his role as supervisor.
 - (b) he will endeavour to fix a regular time for the meeting in order to integrate the circles into the normal working life of the work area;
 - (c) he will leave the time of the meeting floating, in order to give flexibility for both himself and the members;
 - (d) he will ensure the group has a meeting place;
 - (e) he will ensure the group has other resources it needs, including aiding roles;
 - (f) he will ensure the group has the requisite materials, including data;
 - (g) he will ensure the group meets with authority;
 - (h) he will ensure the members are invited/informed so they can attend;
- (ii) he ensures the group has an agreed programme/plan/agenda/objective for its meeting;
- (iii) he ensures that group membership is clear and requisite;
- (iv) he starts the group meeting; he sustains continuity/impetus; he ends the group meeting;
- (v) he controls the discussion by:
 - (a) bringing individuals into the discussion;
 - (b) shutting individuals out of the discussion;

- (c) ensuring only one person speaks at a time;
 - (d) he discourages irrelevance;
 - (e) he suppresses and ends irrelevance;
 - (f) he summarizes the discussion and seeks consensus for the summary;
 - (g) he invites building on ideas;
 - (h) he tests group understanding;
 - (j) he ensures good use of the available time;
 - (k) he encourages the pooling of ideas;
 - (l) he promotes proposals;
 - (m) he promotes consensus;
 - (vi) he ensures group decisions are taken.
 - (vii) he ensures requisite actions on decisions are taken or approved by management;
 - (viii) he ensures the circle obtains and makes use of feedback from previous directions;
 - (ix) he promotes self-sanctioning by the circle.
3. The leader is essential to QC progress because he takes on the role of task leader.
 - (i) He will ensure the circle adopts a systematic approach to its task work.
 4. The leader is essential to the circle because he takes on the role of "felt leader":
 - (i) he induces in the members the feeling that they would like him to be leader;
 - (ii) he promotes and maintains the correct emotional climate for meetings.
 5. The leader will encourage the circle to function informally outside meetings. This will help the members to integrate circle activities into their job. (See 11, Section III).
 6. He will discourage the circle from functioning outside the meetings to avoid antagonizing non-members.
 7. Insofar as the circle leader is the supervisor of the work domain, the relationship between himself and the members in circle activities will reflect the quality of their working relationships outside the circle.

8. Insofar as the circle leader comes from the same work area as the members, their personal relationships within the circle will reflect the quality of those relationships outside the circle.
9. The quality of personal and working relationships both inside and outside the circle will affect its
 - (i) development;
 - (ii) performance.
10. Insofar as the leader of the circle is not of supervisor grade or belongs to a different work domain to the members, he will perform the function of liaison with the supervisor in his members work domain.
11. Quality circle members will regard the supervisor as the most appropriate choice of leader for the quality circle in their work domain.
12. Managers will regard the supervisor as the most appropriate choice of leader of the circles in their work area.
13. A supervisor who is the leader of a circle will already possess a commitment to quality circles.
14. A supervisor who takes on the role of circle leader will develop a commitment to quality circles, or will deepen an existing commitment.
15. A supervisor who is not personally committed to the idea of quality circles will not be motivated to ensure the circle in his work area is a success.
16. A supervisor who is not personally committed to quality circles will endeavour to ensure the circle in his work area is a success if he feels it is important to his subordinates.

B Problem-solving

1. It is important for quality circle
 - (i) development;
 - (ii) performanceto maintain a constant rate of problem-solving and management presentations:
 - to ensure a constant rate of achievement satisfaction for members;
 - to ensure continuing support from management and staffs.

2. The kind of problems selected for examination by a quality circle will reflect the nature of task work in the work domain:
 - (i) quality circle achievement will depend on the accuracy with which QC problems match the degree of complexity/difficulty in the work;
 - (ii) quality circle achievement will depend on the accuracy with which QC problems match the degree of variability of tasks in the work domain.
3. Use of the problem-solving techniques prescribed by the company and learnt during the QC training programme will promote a high and constant success rate for the circles:
 - (i) incorrect use of the prescribed techniques will restrict the circles' creativity and limit their scope;
 - (ii) failure to use the prescribed techniques or failure to use them when appropriate will cause a circle to lose momentum;
 - (a) problem-solving becomes unsystematic and ineffective;
 - (b) the quality of solutions becomes poor or erratic;
 - (c) the number of solutions suitable for implementation will be small;
 - (d) the circles will experience low achievement satisfaction and credibility;
 - (iii) an inadequate training programme or the inexpert application of sound programme will limit the effective use of prescribed techniques.
4. The quality of training in circle techniques for problem-solving will determine in part at least the quality of the solutions a circle can produce.
5. Lack of problems to solve leads to loss of interest among members and the circle loses impetus:
 - (i) production problems are beyond QCs' competence;
 - (ii) production processes are highly engineered;
 - (iii) the product is simple;
 - (iv) the product is complicated;
 - (v) the product is one-off in nature;

- (vi) the circle is poor at choosing its problems.
 - (vii) the circle does not look for problems systematically;
 - (viii) management in the work area restricts the supply of the problems;
 - (ix) the QC meets in weekly or fortnightly cycles but problems do not arise in like cycles.
6. The selection of problems a circle looks at will be a determining factor in that circle's
 - (i) development;
 - (ii) performance.
 7. The problems available to the QC to solve will be those left to them by the engineering function:
 - (i) the circles will be left with chronic, longstanding problems;
 - (ii) the circles will be left with trivial problems.
 8. This will threaten the circles' ability to achieve results and will hinder their
 - (i) development;
 - (ii) performance.
 9. A circle made up of operators with skills varying in type and level will possess a greater potential for problem-solving than those with a narrow range of skills:
 - (i) quality circles work most effectively in work domains whose tasks call for skilled and technically able personnel and least effectively in work domains where the tasks require semi-skilled workers.;
 - (ii) senior management will value the achievements of highly skilled or technologically advanced groups more than those of semi-skilled; this will contrast with the members own perceptions of work.

C The Facilitator

1. The role of the facilitator is indispensable to the:
 - (i) development;
 - (ii) performance
 of quality circles in his jurisdiction.
2. The encouragement and advice of the facilitator is vital to maintain QC momentum, because:

- (i) he offers guidance in problem selection and other areas of task work;
 - (ii) he establishes contacts for the circle;
 - (iii) he smooths the circles' relationships with outside parties;
 - (iv) he coordinates the administration of circles;
 - (v) he provides counselling for leaders and members;
 - (vi) he is custodian of the resources allocated by the company to the circle programme;
 - (vii) he monitors circle development and endeavours to make provision for change.
3. The role of the facilitator is best taken on by a staff man, as he will find less conflict with his formal work role than a line man.
 4. The facilitator does not feel the quality circle role conflicts with his job, either with respect to time or content.
 5. The facilitator has the felt support of:
 - (i) management;
 - (ii) colleagues;
 - (iii) subordinates;
 - (iv) circle leaders;
 - (v) circle members.
 6. There will be a maximum number of circles a facilitator can handle effectively.
 7. The facilitator will only intervene in circle activities when asked by a leader to do so.

D Sell and launch

1. These are instrumental in forming initial attitudes to quality circles.
2. These initial attitudes have persisted and have influenced the:
 - (i) development;
 - (ii) performance
 of quality circles.

SECTION VI - Quality Circle Development

1. Quality circle will develop and evolve over time.

A The work to be done

1. Quality circle task work.

- (i) QCs will extend to higher levels in the hierarchy.
The nature of problems tackled will be increasingly centred on managerial work as opposed to task work as the circles ascend the hierarchy.
- (ii) QCs will move into the "staff" work domain.
- (iii) QCs will move into the service work domain.
- (iv) QCs from several work domains will cooperate to solve problems relevant to their areas.
- (v) QC work will remain focussed on the work domain, but its scope will widen into new areas.
- (vi) QCs will tackle increasingly complex problems.
- (vii) QCs will use increasingly more sophisticated methods of analysis.
- (viii) staffs and managers will become more directly involved in operator QCs.

2. Changes in the nature of the work itself.

- (i) quality circles will develop and evolve as the work in the area develop and evolve;
- (ii) QCs will develop and evolve by taking on more uncertainty and change.

3. QCs will move into work areas that are sequentially related or are parallel.

4. QCs will extend within a single work domain.

B Quality circle processes

1. the format of QC processes will change;
2. the structure of QCs as a group will change (leadership/followership patterns).

C Growth/Decay Patterns

1. QCs will follow one or more of the following:
 - (i) learning curve;
 - (ii) novelty/boredom;

- (iii) marriage path;
 - (iv) "Orwell" path;
 - (v) boost blow-back path;
 - (vi) bliss and exit path.
2. Leaders and members will develop skills from their involvement in QC activities and will become more confident in the use of them.

SECTION VII - Circle Performance

1. Management will monitor quality circle performance.
2. Management will develop a set of criteria against which circle performance will be monitored.
3. These criteria will be derived from the key results they set for QCs.
4. The members' perceptions of QC performance will depend on the extent to which the reality of circle membership meets their expectations of it.
5. If the members' perception is that QCs are a success, they will continue to participate and continue that success.
6. QC members' attitude to the circles is to some extent an indicator of their perceptions of QC performance.

SECTION VIII - Quality Circles as "Effective Groups"

A General

1. The circle is of a size to promote effective interaction:
 - (i) there is evidence of individual skill in leadership/followership;
 - (ii) individual members feel free to participate in the group and are confident that their ideas will be given fair treatment;
 - (iii) there is mutual confidence and trust;
 - (iv) members are highly motivated to abide by the values and achieve the goals of the group;
 - (v) they feel the circle accurately reflects their own ideas and objectives;

- (vi) there is a supportive atmosphere, which stimulates creativity;
 - (vii) the group is flexible and adaptable;
 - (viii) members are motivated to exert influence on each other and on their leader to achieve best possible solutions.
2. Quality circles function most effectively when their members represent a wide spectrum of characteristics.

B Cohesiveness

- 1. A quality circle will be more cohesive the more its members give and ask for information.
- 2. The cohesiveness of a group, insofar as it is indicated by the strength of leadership/followership structures, will be indicated by the extent to which the group's ad hoc leader collects and distributes information.
- 3. Cohesiveness is characterized by frequent interaction that includes all members.
- 4. An indication of cohesiveness will be interaction of certain kinds.
- 5. An indication of lack of cohesiveness will be interaction of certain kinds.
- 6. Requisitely the QC will have two forms of leadership role, and therefore two forms of followership relationship - the process/organizational work leader and the task-able leader.
- 7. In order that the group may function its effort successfully on a problem and at the same time deal with problems that call for a variety of functional expertise, the first type of leader will tend to be permanent and the second will tend to change according to the problem at hand.
- 8. In the long term, the process/organizational work leader will tend to enjoy higher status in the group than the task-able leader.
- 9. Functional aspects of cohesiveness require short-term cohesion; effective leadership requires long-term. The leader must therefore work to further long-term cohesion.
- 10. The more successful a group is from a social point of view, the more outsiders will reject it.

11. The more successful from a social point of view the group feels itself to be the more it will reject outsiders.

C Information services for QCs

1. The effectiveness of quality circles is a function of the availability of information and supportive services and the behaviour of those providing them.
2. Individuals within these supportive services will feel their position is threatened by the information generated by QCs.
3. QCs will act as a catalyst to improve the functioning of existing communication channels within the organization.
4. Circles do not feel there are any constraints on the conclusions they reach. They do not distort data to arrive at management-preferred solutions.

APPENDIX 4

FIELD WORK

APPENDIX 4

FIELD WORK

Date	Duration	Location	Objective(s) + Method of Attainment
September 1981	One month	13	Temporary employment to assimilate company culture
February 1981	One week	13 14	Familiarisation visit to determine: - company organization and culture - quality circle organization and history - an agreed programme of research
March 1982	Two weeks	21	RUN 1 Pilot research programme to: - test research methodology - formulate final hypothesis list - collect data
September 1982	Two weeks (approx.)	21 22 32 34 13 14	Visit to units selected for study to: - establish contacts - collect background information
November 1982 March 1983	10 weeks	21 22 32 34 13 14	RUN 2 Collection of data to test hypotheses, via: - questionnaire - interviews - group process observation together with assimilation of all other types of information require, via - discussions - examination of documents - personal observation - impressions
January 1984 March 1984	8 weeks	21 22 32 34 14	RUN 3 As Run 2 above

APPENDIX 5
THE QUESTIONNAIRE

APPENDIX 5

THE QUESTIONNAIRE

The questionnaire is designed primarily to help discern attitudes to quality circles on the shop-floor. It was designed around six main attitude scales.

1. To measure general attitude to work - five component variables (questions 6-10) - SCALE J.
2. To measure general attitude to quality circles - five component variables (questions 11, 12, 17, 18, 22) - SCALE P.
3. To measure the perceived impact of quality circles on the unit - four component variables (questions 13, 22, 24, 26) - SCALE I.
4. To measure management attitudes, as perceived by the shop-floor, to quality circles - two component variables (questions 13, 21) - SCALE M.
5. To measure the expected non-pecuniary rewards to be gained from quality circles - two component variables (questions 15, 20) - SCALE R.
6. To measure the extent to which quality circles information is disseminated - two component variables (questions 16, 19) - SCALE T.

Also included are questions to enable the classification of respondents according to characteristics.

QUALITY CIRCLES

About a year ago people in STC Components were asked to give their opinions about quality circles as part of a research project being conducted at Nottingham University. It has been decided to repeat the survey to see if ideas have changed.

Once again, a number of STC employees have been selected at random to help with the project by completing a questionnaire, and your name was chosen.

This questionnaire is asking for your opinions about quality circles in general - you do not have to give your views on particular individuals or groups. It does not matter whether you filled in the survey before.

If you decide to fill in the questionnaire, YOUR ANSWERS TO ALL THE QUESTIONS WILL BE TREATED AS COMPLETELY ANONYMOUS AND CONFIDENTIAL. You are not required to give your name and no-one in the company will see your completed form. You have been given an envelope in which to seal the questionnaire when you have finished. Once sealed, the envelope will not be opened until I return to Nottingham.

The aim is to get as many opinions as possible, so please give your own views, even if you have not been involved with quality circles.

Thank you very much for your help.

Jane Hodgins
Department of Industrial Economics
University of Nottingham

If possible, please complete and return by

SECTION ONE

FIRST, HERE ARE SOME GENERAL QUESTIONS ABOUT QUALITY CIRCLES.

PLEASE TICK.

1. Is there a quality circle
in your work area? ☐ Yes ☐ No

2. Are you a quality circle
member? ☐ Yes ☐ No

*QUALITY CIRCLE MEMBERS ONLY - PLEASE LEAVE QUESTION 3 AND MOVE ON TO
QUESTION 4.*

3. If you do not belong to
a circle, have you been
a member in the past? ☐ Yes ☐ No

4. Has any change been
introduced to your work
or your work area as a
result of a quality circle
project? ☐ Yes ☐ No

5. In your opinion, have
any quality circle projects
resulted in improvements
which have made your job
easier? ☐ Yes ☐ No

Please Turn Over

SECTION TWO

THESE QUESTIONS ARE CONCERNED WITH HOW YOU FEEL ABOUT WORK IN GENERAL.

READ THROUGH THE FOLLOWING STATEMENTS. FOR EACH STATEMENT, CHOOSE THE RESPONSE YOU THINK BEST APPLIES TO YOU AND PLACE A TICK IN THE CORRESPONDING BOX.

	Strongly Agree	Agree	Indifferent/ Unable to Decide	Disagree	Strongly Disagree
6. I enjoy being at work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. My job is secure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. In general, I am satisfied with my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I am often bored in my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I do not like my job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please Turn Over

SECTION THREE

THE QUESTIONS IN THIS SECTION ASK ABOUT PARTICULAR ASPECTS OF QUALITY CIRCLES.

READ THROUGH THESE STATEMENTS. CHOOSE THE RESPONSE YOU THINK BEST APPLIES TO YOU AND PLACE A TICK IN THE CORRESPONDING BOX.

	Strongly Agree	Agree	Indifferent/ Unable to Decide	Disagree	Strongly Disagree
11. Quality circles are a good idea.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. All in all, I think this unit would be better off without quality circles.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Management here think quality circles are a good idea.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Quality circles have come up with ideas which have really improved the way work is done in this unit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please Turn Over

SECTION THREE CONTINUED

	Strongly Agree	Agree	Indifferent/ Unable to Decide	Disagree	Strongly Disagree
15. The presence of quality circles in a unit makes jobs more secure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Quality circles do not tell non- members enough about their activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Quality circles will still be operating in this unit in two year's time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Quality circles interfere with the smooth running of the unit.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Operators who are not members of quality circles want to know what the quality circles are doing from week to week.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION THREE CONTINUED

	Strongly Agree	Agree	Indifferent/ Unable to Decide	Disagree	Strongly Disagree
20. Membership of a quality circle improves chances of promotion.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Management do not show enough interest in quality circle projects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Quality circles are a waste of time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. What do you think quality circles hope to achieve?

(PLEASE CHOOSE AS MANY OPTIONS AS YOU WISH).

- Solve work problems
- Increase output
- Improve Relationships between operators and management
- Reduce costs
- Improve quality
- Improve operating procedures
- Increase job awareness
- Improve reject rates
- Increase job satisfaction
- Other

IF 'OTHER' PLEASE SPECIFY:

24. Overall, to what extent do they achieve these things in your unit?

<input type="checkbox"/>	Completely
<input type="checkbox"/>	Quite a lot
<input type="checkbox"/>	In some ways
<input type="checkbox"/>	Not much
<input type="checkbox"/>	Not at all

25. Have you changed your opinion of quality circles in any way since you first heard about them?

<input type="checkbox"/>	Completely
<input type="checkbox"/>	Quite a lot
<input type="checkbox"/>	In some ways
<input type="checkbox"/>	Not much
<input type="checkbox"/>	Not at all

26. In general, how much has the way this unit operates been changed by the quality circles?

<input type="checkbox"/>	Completely
<input type="checkbox"/>	Quite a lot
<input type="checkbox"/>	In some ways
<input type="checkbox"/>	Not much
<input type="checkbox"/>	Not at all

Please Turn Over

SECTION FOUR

FINALLY, SOME QUESTIONS ABOUT YOU. NO ATTEMPT WILL BE MADE TO IDENTIFY INDIVIDUALS FROM THEIR ANSWERS TO THIS SECTION.

PLEASE TICK.

27. Your age

<input type="checkbox"/>	16 - 25
<input type="checkbox"/>	26 - 35
<input type="checkbox"/>	36 - 45
<input type="checkbox"/>	46 - 55
<input type="checkbox"/>	56 and over

28. Your sex

<input type="checkbox"/>	Male
<input type="checkbox"/>	Female

29. Do you work

<input type="checkbox"/>	Full-time
<input type="checkbox"/>	Part-time

30. Do you work shifts?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

31. How long have you worked
for STC Components?

<input type="checkbox"/>	Less than 1 year
<input type="checkbox"/>	1 - 2 years
<input type="checkbox"/>	3 - 5 years
<input type="checkbox"/>	6 - 10 years
<input type="checkbox"/>	11 - 20 years
<input type="checkbox"/>	21 years and over

Please Turn Over

SECTION FOUR CONTINUED

32. How long have you been in
your present job?

<input type="checkbox"/>	Less than 1 year
<input type="checkbox"/>	1 - 2 years
<input type="checkbox"/>	3 - 5 years
<input type="checkbox"/>	6 - 10 years
<input type="checkbox"/>	11 - 20 years
<input type="checkbox"/>	21 years and over

Do you have any comments you would like to add?

THANK YOU FOR TAKING THE TIME TO FILL IN THIS QUESTIONNAIRE.

APPENDIX 6
INTERVIEW CHECKLISTS

APPENDIX 6

INTERVIEW CHECKLISTS

Contained in this appendix are the interview checklists used in the research programme. They are as follows:

1. Staff/engineers
2. Managers
3. Forms issued to 1 and 2 above.

STAFF/ENGINEERS

1. What do quality circles achieve?

READ OUT

2. Here is a list of things which, generally speaking, QC's could achieve or help to achieve through problem-solving. If QC's were able to meet these objectives, which would be the most useful to the unit, in your opinion?

GIVE FORM K

PLEASE RANK THE ITEMS IN TERMS OF THEIR USEFULNESS.
GIVE A SCORE OF 1 TO THE MOST USEFUL AND A SCORE OF 13
TO THE LEAST USEFUL.

Cost control/reduction
Quality improvement
Work pace to schedule
Output increased
Down time minimised
Operator efficiency improved
Targets met
Motivation of workforce
Training of workforce
Good relations between work areas
Good relations between shop-floor and management
Good customer relations
Innovation/new ideas

GIVE FORM L

READ OUT

3. Here is the same list again. In your view, how successful are QCs at achieving these objectives?

PLEASE CIRCLE THE POINT ON THE HORIZONTAL LINE WHICH CORRESPONDS WITH YOUR VIEW.

Cost control/reduction
Quality improvement
Work pace to schedule
Output increased
Down time minimised
Operator efficiency improved
Targets met
Motivation of workforce
Training of workforce
Good relations between work areas
Good relations between shop-floor and management
Good customer relations
Innovation/new ideas

4. Do you think quality circles have a place in this unit?

..... Yes

..... No

5. Are quality circles useful to the company?

..... Yes

..... No

6. Are the shop-floor aware of engineering attitudes to QCs?

..... Yes

..... No

7. Do the circles turn up solutions which cannot be implemented for one reason or another?

..... Yes

..... No

8. For what reasons?

9. Do you think these reasons are explained to the circles?

..... Yes

..... No

10. In your view, are some circles more successful than others?

..... Yes

..... No

11. What factors lead to this greater degree of success?

12. How do you think QCs will fare in future?

13. Would QCs benefit if they changed the sort of problems they tackle?

..... Yes

..... No

14. Would QCs benefit if they changed the way they analyse problems?

..... Yes

..... No

15. Is the QC formula a good way to solve work problems?

..... Yes

..... No

16. Does the QC formula produce good solutions to problems, in general?

..... Yes

..... No

17. To what extent have QCs been affected by changes in the unit's performance, in general?

18. In particular, has the QCs ability to achieve results been affected by unit changes?

..... Yes

..... No

19. How often do QCs come up with useful results?

20. Are there some QCs which perform noticeably better than others?

..... Yes

..... No

21. Are there some QCs which perform noticeably worse than others?

..... Yes

..... No

22. In your experience, do QCs tend to select problems which they do not have the skills to tackle?

..... Yes

..... No

23. Are there some types of work area where QCs (would/do) find it difficult to work effectively?

..... Yes

..... No

24. What is your opinion of QCs?

WHERE APPLICABLE

25. Have you ever been to a QC meeting?

..... Yes

..... No

26. What was your reaction to it?

27. Do you think circles will need (need more) guidance in selecting problems?

..... Yes

..... No

28. Should engineers be consulted about the problems QCs tackle?

..... Yes

..... No

29. Do you think QCs will ever progress to more complex problems?

..... Yes

..... No

30. Do you think QCs will ever progress to problems with wider scope?

..... Yes

..... No

GIVE THANKS

MANAGERS

1. What do quality circles achieve?

READ OUT

GIVE FORM K

2. Here is a list of things which, generally speaking, QC's could achieve or help to achieve through problem-solving. If QC's were able to meet these objectives, which would be the most useful to the unit, in your opinion?

PLEASE RANK THE ITEMS IN TERMS OF THEIR USEFULNESS.
GIVE A SCORE OF 1 TO THE MOST USEFUL AND A SCORE OF 13
TO THE LEAST USEFUL.

Cost control/reduction
Quality improvement
Work pace to schedule
Output increased
Down time minimised
Operator efficiency improved
Targets met
Motivation of workforce
Training of workforce
Good relations between work areas
Good relations between shop-floor and management
Good customer relations
Innovation/new ideas

GIVE FORM L

READ OUT

3. Here is the same list again. In your view, how successful are QCs at achieving these objectives?

PLEASE CIRCLE THE POINT ON THE HORIZONTAL LINE WHICH CORRESPONDS MOST CLOSELY WITH YOUR VIEW.

Cost control/reduction
Quality improvement
Work pace to schedule
Output increased
Down time minimised
Operator efficiency improved
Targets met
Motivation of workforce
Training of workforce
Good relations between work areas
Good relations between shop-floor and management
Good customer relations
Innovation/new ideas

4. Is the QC formula a good way to solve work problems?

..... Yes

..... No

5. In your experience, do QCs tend to select problems which they do not have the skills to tackle?

..... Yes

..... No

6. Would QCs benefit if they changed the sort of problems they tackle?

..... Yes

..... No

7. Would QCs benefit if they changed the way they analyse problems?

..... Yes

..... No

8. Does the QC formula produce good solutions to problems, in general?

..... Yes

..... No

9. Do the circles turn up solutions which cannot be implemented for one reason or another?

..... Yes

..... No

10. For what reasons?

11. Do you think these reasons are explained to the circles?

..... Yes

..... No

12. Have QCs improved communication in the unit?

..... Yes

..... No

13. For what reasons?

14. Are the shop-floor aware of management attitudes to QCs?

..... Yes

..... No

15. Have QCs changed attitudes in the unit, in any way?

..... Yes

..... No

16. Are QCs a move towards greater participation for the workforce?

..... Yes

..... No

17. Are there some types of work area where QCs (would/do) find it difficult to work effectively?

..... Yes

..... No

18. In your view, are some circles more successful than others?

..... Yes

..... No

19. What factors lead to this greater degree of success?

..... Yes

..... No

20. Are there some QCs which perform noticeably worse than others?

..... Yes

..... No

21. To what extent have QCs been affected by changes in the unit's performance, in general?

..... Yes

..... No

22. In particular, has the QCs ability to achieve results been affected by unit changes?

..... Yes

..... No

23. Are quality circles useful to the company?

..... Yes

..... No

24. How often do QCs come up with useful results?

25. Against what criteria do you think other managers measure QC performance?

26. Do management monitor QC performance?

..... Yes

..... No

27. How do you think QCs will fare in future?

28. How do you see circles developing in future?

GIVE THANKS

FORM K

Here is a list of things which, generally speaking, QC's could achieve or help to achieve through problem-solving. If QC's were able to meet these objectives, which would be the most useful to the unit, in your opinion?

PLEASE RANK THE ITEMS IN TERMS OF THEIR USEFULNESS. GIVE A SCORE OF 1 TO THE MOST USEFUL AND A SCORE OF 13 TO THE LEAST USEFUL.














Rank

- | | |
|-------|---|
| ..... | Cost control/reduction |
| ..... | Quality improvement |
| ..... | Work pace to schedule |
| ..... | Output increased |
| ..... | Down time minimised |
| ..... | Operator efficiency improved |
| ..... | Targets met |
| ..... | Motivation of workforce |
| ..... | Training of workforce |
| ..... | Good relations between work areas |
| | Good relations between shop-floor and
management |
| ..... | Good customer relations |
| ..... | Innovation/new ideas |

FORM L

Here is the same list again. In your view, how successful are quality circles at achieving these objectives?

PLEASE CIRCLE THE POINT ON THE HORIZONTAL LINE WHICH MOST CLOSELY CORRESPONDS TO YOUR VIEW.

	Very Successful		Not at all Successful
1		1	Cost control/reduction
2		2	Quality improvement
3		3	Work pace to schedule
4		4	Output increased
5		5	Down time minimised
6		6	Operator efficiency improved
7		7	Targets met
8		8	Motivation of workforce
9		9	Training of workforce
10		10	Good relations between work areas
11		11	Good relations between shop-floor and management
12		12	Good customer relations
13		13	Innovation/new ideas

APPENDIX 7

GROUP PROCESS OBSERVATION

APPENDIX 7

GROUP PROCESS OBSERVATION

This appendix contains the forms used to record interaction. Table 3 shows the number of quality circle meetings attended during the research programme at each unit. The numbers do not equate to the numbers of quality circles in each unit at the time, since some groups may not have met at all during the period of field work for various reasons, and some circles may have been visited more than once during each visit. The initial purpose was to structure the meetings attended but this became impossible mainly for practical reasons. The strategy was to draw up a priority list before each field visit, so that circles which had been visited most often in the past were at the top of the list. Thus a detailed picture of certain quality circles could be built up. Each quality circle was visited at least once, if it was in full operation at the time of a field visit.

Table 4 breaks down the meetings attended to show the frequency with which each quality circle was visited. It can be seen that out of 37 circles visited, at least once, approximately one-quarter were seen twice, one-fifth three times, one-seventh four times and just one circle, five times.

GROUP PROCESS INTERACTION SCHEDULE

	5	10	15	20	25	30	35	40	45	50	55	60
Proposing												
Building												
Supporting/ Listening												
Disagreeing												
Defending/ Attacking												
Blocking / Difficulty stating												
Open / Joking												
Testing under - standing												
Summarising												
Seeking information												
Giving information												
Shutting out												
Bringing in												
Decision												
Feedback												
Influence												
Subconv												
Deviation												
Sleepers												

TABLE 3
QUALITY CIRCLE MEETINGS ATTENDED

Unit	Run 1 ¹	Run 2	Run 3	Total
34	-	1	3	4
32	1	2	1	4
21	9	15	17	41
22	-	8	2	10
13	1	1	-	2
14	2	5	11	18
Totals	13	32	34	79

¹ Includes pilot survey and other miscellaneous field visits at around the same time (February/March 1982).

TABLE 4
NUMBER OF QUALITY CIRCLES PER UNIT OBSERVED AT VARIOUS FREQUENCIES

Unit	Frequency of Observation per Quality Circle					Total No. of Meeting
	5	4	3	2	1	
34	-	-	-	1	2	4
32	-	-	1	-	1	4
21	1	3	4	3	6	41
22	-	-	-	3	4	10
13	-	-	-	1	-	2
14	-	2	2	1	2	18
Total No. of Circles	1	5	7	9	15	
Cumulative Percentage	2.7	16.2	35.1	59.4	100	

APPENDIX 8
ANALYSIS OF TASKS

APPENDIX 8
ANALYSIS OF TASKS

This appendix contains the methods used to categorize task work, both within quality circles and in the course of everyday work.

TABLE 5
WORK AREAS ANALYSED BY TASK

TASK VARIABILITY					
TASK DIFFICULTY	Complex Task Repetitive Task		Complex Task Varied Task		TASK DIFFICULTY
	14	0	14	0	
	21	5	21	3	
	22	1	22	1	
	Total	6	Total	4	
	14	3	14	4	
	21	3	21	2	
	22	4	22	4	
	Total	10	Total	10	
	Easy Task Repetitive Task		Easy Task Varied Task		
TASK VARIABILITY					

The total number of work areas studied in these three units is 30. Where more than one shift operates in the same area, each shift is treated as a separate work domain.

QUALITY CIRCLE:

UNIT:

DATE:

TASK DIFFICULTY CHECKLIST

1. Clearly defined body of knowledge as a guide?

2. Understandable sequence of steps to be followed?

3. Specific problems - cannot be solved immediately.

Very often Sometimes Rarely

4. Thinking time in solving a problem.

5. Handing problems over to others.

Very often Sometimes Rarely

6. Outcome of task work - predictable or unpredictable?

7. Time lag for outcome of task work.

QUALITY CIRCLE:

UNIT:

DATE:

TASK VARIABILITY CHECKLIST

1. Variety in a working day.

No of different batches (X)

No of different products/pieceparts/subassemblies?

2. Are methods constant for different batches?

3. Routine?

4. Repetitive?

TABLE 6
QUALITY CIRCLE TASK WORK ANALYSED BY TYPE

Unit		Type of Task Work						Total	
		1	2	3	4	5	6	n	%
21	n	43	54	11	-	9	25	142	65
	%	30	38	8	-	6	18		
22	n	10	13	4	-	2	5	34	15
	%	29	38	12	-	6	15		
14	n	13	23	-	1	4	3	44	20
	%	30	52	-	2	9	7		
Total	n	66	90	15	1	15	33	220	100
	%	30	41	7	-	7	15		

Key: Type of Task Work

1. Quality/scrap/rejects.
2. Improve production procedures.
3. Reduce costs.
4. Increase output.
5. Environment.
6. Other.

Quality Circle Tasks - Category "Other"

Below are projects completed by quality circles which cannot be assigned to any of the categories 1 to 5.

Unit 21

1. Development of tooling for new piecepart (in conjunction with engineering).
2. Training - of new operators (production of video).
 - in use of computers.
 - of existing operators.

3. Quality circles - retraining in techniques.
 - general.
 - inter-circle linkages.
 - publicity.
4. Communications (two quality circles).
5. Accidents and safety (two quality circles).
6. Maintenance, availability and awareness of production information (eight quality circles).
7. Maintenance of tools and machines (two quality circles).
8. Control of waste material.

Unit 22

1. Training of existing operators.
2. Communications.
3. Awareness of product.
4. Maintenance of production information.
5. Development of new information and quality system.

Unit 14

1. Awareness of other production areas
 - visits
 - exhibitions/displays.
2. Retraining of operators - on the job
 - in quality circles.

APPENDIX 9
QUESTIONNAIRE RESPONSES

APPENDIX 9**QUESTIONNAIRE RESPONSES****TABLE 7****QUESTIONNAIRE DISTRIBUTION AND RESPONSE**

Unit	Number of Respondents		% Response	
	Run 2	Run 3	Run 2	Run 3
34	20	33	66	80
32	30	22	41	73
21	100	114	80	82
22	80	40	80	44
13	37	-	80	-
14	60	82	88	76
Totals (Average Response Rate)	327	291	74%	71%

TABLE 8

MEMBERSHIP OF QUALITY CIRCLES AND QUESTIONNAIRE RESPONSE

Unit	Number of Members Responding		Number of Ex-members Responding		Number of Members in Unit	
	Run 2	Run 3	Run 2	Run 3	Run 2	Run 3
34	10	14	-	4	16	22
32	11	4	1	1	14	6
21	76	77	2	13	88	99
22	35	24	15	6	75	44
13	7	-	8	-	12	-
14	24	28	2	9	36	40
Total	163	147	28	33	241	211
% of Members	68	70				
% of Total Responses	50	51				

TABLE 9

ATTITUDE SCALES AND COMPONENT VARIABLES
MATRIX OF INTERCORRELATIONS

Scale and Component		Unit and Data Run											
		34		32		21		22		13	14		
		2	3	2	3	2	3	2	3	2	2	3	
J	1	.63	.55	.61	.60	.51	.43	.62	.63	.61	.68	.36	
J	2	.26	(.46)	.27	.16	.37	.25	.26	(.42)	.52	.47	.42	
J	3	.65	.70	.75	.72	.72	.59	.56	.56	.54	.52	.44	
J	4	.71	.65	.68	.64	.47	.42	.62	.67	.62	.50	.48	
J	5	.72	.75	.65	.63	.57	.54	.82	.76	.68	.51	.53	
P	1	.55	.62	.52	.46	.61	.50	.41	.33	.70	.81	.72	
P	2	.65	.71	.51	.53	.72	.60	.38	.39	.62	.71	.67	
P	3	.19	.38	.27	(.46)	.37	.28	(.39)	.31	.49	.15	.48	
P	4	.47	(.37)	.18	.47	.41	.36	.14	.35	.47	.54	.49	
P	5	.64	.66	.64	.59	.69	.51	.37	.52	.65	.68	.60	
I	1	.51	.44	.62	.48	.57	.46	.48	.50	.54	.51	.52	
I	2	.70	.68	.57	.36	.41	.43	.37	.28	.51	.42	.37	
I	3	.64	.60	.55	.46	.59	.52	.59	.41	.50	.71	.62	
I	4	.73	.68	.49	.47	.52	.50	.62	.41	.63	.62	.50	

Notes

1. Values given are for Kendall's tau, with a significance level less than or equal to 0.005.
2. Values in brackets are significant to a level greater than 0.005, but less than 0.01.
3. Key to variables is presented overleaf.

TABLE 10

ATTITUDE SCALES: KEY TO COMPONENT VARIABLES

Scale J : Overall job satisfaction

1. I enjoy being at work.
2. My job is secure.
3. In general, I am satisfied with my job.
4. I am often bored in my job (reverse scored).
5. I do not like my job (reverse scored).

Scale P : Attitude to quality circles

1. Quality circles are a good idea.
2. All in all, I think this unit would be better off without quality circles (reverse scored).
3. Quality circles will still be operating ... in two years' time.
4. Quality circles interfere with the smooth running of the unit (reverse scored).
5. Quality circles are a waste of time (reverse scored).

Scale I : Perceived impact of quality circles

1. Quality circles have come up with ideas which have really improved the way work is done in this unit.
2. Quality circles are a waste of time (reverse scored).
3. Overall, to what extent do they achieve these things in your unit?
4. In general, how much has the way this unit operates been changed by the quality circles?

TABLE 11

CHARACTERISTICS OF RESPONDENTS - AGE (percentages are in brackets)

RUN 2

Unit	Age In Years					No Reply	Total
	16-25	26-35	36-45	46-55	56-65		
34	6 (30.0)	3 (15.0)	4 (20.0)	3 (15.0)	2 (10.0)	2 (10.0)	20
32	5 (16.7)	5 (16.7)	5 (16.7)	8 (26.7)	7 (23.2)	-	30
21	20 (20.0)	12 (12.0)	18 (18.0)	31 (31.0)	13 (13.0)	6 (6.0)	100
22	10 (12.5)	18 (22.5)	21 (26.2)	17 (21.2)	13 (16.2)	1 (1.2)	80
13	2 (5.4)	10 (27.0)	10 (27.0)	12 (32.4)	2 (5.4)	1 (2.7)	37
14	6 (10.0)	7 (11.7)	13 (21.7)	25 (41.7)	8 (13.3)	1 (1.7)	60
Totals	49 (15.0)	55 (16.8)	71 (21.7)	96 (29.3)	45 (13.8)	11 (3.4)	327

RUN 3

Unit	Age In Years					No Reply	Total
	16-25	26-35	36-45	46-55	56-65		
34	11 (33.3)	5 (15.2)	8 (24.2)	7 (21.2)	1 (3.0)	1 (3.0)	33
32	3 (13.6)	1 (4.5)	3 (13.6)	9 (40.9)	6 (27.3)	-	22
21	19 (16.7)	17 (14.9)	26 (22.8)	31 (27.2)	20 (17.5)	1 (0.9)	114
22	21 (52.5)	8 (20.0)	5 (12.5)	3 (7.5)	1 (2.5)	2 (5.0)	40
13	-	-	-	-	-	-	-
14	7 (8.5)	6 (7.3)	20 (24.4)	31 (37.8)	17 (20.7)	1 (1.2)	82
Totals	61 (21.0)	37 (12.7)	62 (21.3)	81 (27.8)	45 (15.4)	5 (1.7)	291

TABLE 12

CHARACTERISTICS OF RESPONDENTS - SEX (percentages in brackets)

Unit	Run 2				Run 3			
	Male	Female	No reply	Total	Male	Female	No reply	Total
34	8 (40.0)	12 (60.0)	-	20	12 (36.4)	20 (60.6)	1 (3.0)	33
32	8 (26.7)	22 (73.3)	-	30	13 (59.1)	9 (40.9)	-	22
21	83 (83.0)	17 (17.0)	-	100	102 (89.5)	11 (9.6)	1 (0.9)	114
22	70 (87.5)	10 (12.5)	-	80	30 (75.0)	9 (22.5)	1 (2.5)	40
13	28 (75.7)	9 (24.3)	-	37	-	-	-	-
14	4 (6.7)	54 (90.0)	2 (3.3)	60	13 (15.9)	68 (82.9)	1 (1.2)	82
Totals	201 (61.5)	124 (37.9)	2 (0.6)	327	170 (58.4)	117 (40.2)	4 (1.4)	291

TABLE 13**CHARACTERISTICS OF RESPONDENTS - LENGTH OF TIME IN CURRENT JOB
IN YEARS**

Unit	Run 2		Run 3	
	Average No.	Maximum	Average No.	Maximum
34	6.7	26	3.8	18
32	5.1	25	7.4	15
21	9.0	30	10.2	32
22	5.6	24	1.3	12
13	6.8	20	-	-
14	8.2	23	9.4	22

TABLE 14**CHARACTERISTICS OF RESPONDENTS - LENGTH OF TIME WITH COMPANY
IN YEARS**

Unit	Run 2		Run 3	
	Average No.	Maximum	Average No.	Maximum
34	9.8	27	6.6	25
32	12.0	26	19.1	24
21	14.5	35	17.7	37
22	9.8	32	3.6	22
13	9.0	21	-	-
14	10.9	26	17.3	27

TABLE 15**ATTITUDES TO WORK AND TO QUALITY CIRCLES**Scale J : (overall job satisfaction)Run 2 : Percent of Respondents

Response Category	Unit					
	34	32	21	22	13	14
Positive	45.0	50.0	12.0	45.0	40.5	45.0
Neutral	50.0	46.7	61.0	40.0	48.6	50.0
Negative	5.0	3.3	25.0	15.0	10.9	3.3
No Reply	-	-	2.0	-	-	1.7

TABLE 16Run 3 : Percent of Respondents

Response Category	Unit					
	34	32	21	22	13	14
Positive	39.4	50.0	45.6	20.0		31.7
Neutral	45.4	31.8	40.3	40.0		52.4
Negative	15.2	18.2	12.3	37.5		11.0
No reply	-	-	1.8	2.5		4.9

TABLE 17**ATTITUDES TO WORK AND TO QUALITY CIRCLES****Scale P : (Overall attitude to quality circles)****Run 2 : Percent of Respondents**

Response	Unit					
Category	34	32	21	22	13	14
Positive	50.0	36.7	15.0	36.5	49.0	30.0
Neutral	45.0	56.7	66.0	45.0	40.0	58.3
Negative	5.0	6.6	16.0	16.0	11.0	6.7
No reply	-	-	3.0	2.5	-	5.0

TABLE 18**Run 3 : Percent of Respondents**

Response	Unit					
Category	34	32	21	22	13	14
Positive	36.4	40.9	49.1	25.0		39.0
Neutral	48.4	50.0	37.7	65.0		51.2
Negative	15.2	9.1	12.3	7.5		4.9
No reply	-	-	0.9	2.5		4.9

TABLE 19**ATTITUDES TO WORK AND TO QUALITY CIRCLES**Scale I : (perceived impact of quality circles)Reun 2 : Percent of Respondents

Response	Unit					
Category	34	32	21	22	13	14
Positive	30.0	26.7	13.0	10.0	22.0	21.7
Neutral	30.0	10.0	42.0	28.7	29.0	28.3
Negative	30.0	56.7	43.0	58.8	49.0	38.3
No reply	10.0	6.6	2.0	2.5	-	11.7

TABLE 20Run 3 : Percent of Respondents

Response	Unit					
Category	34	32	21	22	13	14
Positive	15.2	9.1	24.5	5.0		17.1
Neutral	39.3	54.5	42.1	55.0		51.2
Negative	45.5	36.4	32.5	37.5		26.8
No reply	-	-	0.9	2.5		4.9

TABLE 21**ATTITUDE SCALE I : SAMPLE QUESTION**

Q: In general, how much has the way this unit operates been changed by quality circles?

Percent of Respondents 1983 (Run 2)

Response Alternative	Unit					
	34	32	21	22	13	14
Completely	-	-	-	-	5.4	1.7
Quite a lot	10.0	-	15.0	55.0	13.5	3.3
In some ways	35.0	7.1	42.0	33.7	29.7	25.0
Not much	10.0	28.6	23.0	32.5	16.2	35.0
Not at all	5.0	50.0	17.0	18.8	27.0	13.3
No reply	40.0	14.3	3.0	10.0	8.2	21.7

Percent of Respondents 1984 (Run 3)

Response Alternative	Unit					
	34	32	21	22	13	14
Completely	-	9.1	0.9	-		-
Quite a lot	12.1	9.1	19.3	7.5		8.5
In some ways	30.3	18.2	27.2	32.5		37.8
Not much	42.4	27.3	36.0	40.0		37.8
Not at all	12.1	31.8	14.9	15.0		6.1
No reply	3.0	4.5	1.8	5.0		9.8

TABLE 22

**DIFFERENCES IN ATTITUDES BETWEEN QUALITY CIRCLE MEMBERS AND
NON-MEMBERS**

Correlation coefficient : Spearman's Rho

Correlation	Unit : Run 2						
	34	32(1)	32(2)	21	22	13	14
Scale J, QCM	*	*	.49	*	*	*	*
Scale P, QCM	*	.49	*	*	.52	.49	.39
Scale I, QCM	*	.56	*	*	.26	*	*
Correlation	Unit : Run 3						
	34	32(1)	32(2)	21	22	13	14
Scale J, QCM	*	.38		*	*	x	*
Scale P, QCM	.55	.49		.55	*	x	.21
Scale I, QCM	.43	.38		.60	*	x	.24

Notes

* denotes a relationship with a significance level greater than 0.075.

x denotes accurate figures are unavailable.

Key

Scale J - overall job satisfaction

Scale P - attitudes to quality circles

Scale I - perceived impact of quality circles

QCM - membership of a quality circle

TABLE 23

ATTITUDE SCALE CORRELATIONS - SPEARMAN'S RHO

Correlation	Unit : Run 2						
	34	32(1)	32(2)	21	22	13	14
Scale J, Scale P	*	.71	.48	x	*	.39	*
Scale J, Scale I	*	*	*	x	*	.29	.28
Scale P, Scale I	*	*	.56	x	.31	.29	.35
Correlation	Unit : Run 2						
	34	32(1)	32(2)	21	22	13	14
Scale J, Scale P	*		.39	.25	*	x	.29
Scale J, Scale I	*		*	.32	.46	x	.41
Scale P, Scale I	.80		.75	.77	.54	x	.67

Notes

* denotes a relationship with a significance level greater than 0.075.

x denotes accurate figures are unavailable.

Key

Scale J - overall job satisfaction

Scale P - attitude to quality circles

Scale I - perceived impact of quality circles

TABLE 24

QUESTION 4

Q : Has any change been introduced to your work or your work area as a result of a quality circle project?

Run 3 : Percent of all respondents

Response	Unit				
	34	32	21	22	14
Yes	63.6	31.8	59.6	52.5	43.9
No	33.3	68.2	37.7	40.0	42.7
Don't know/ No reply	3.0	-	2.6	7.5	13.4

TABLE 25

Run 3 : Differences between quality circle members (1)
and others (2) : Percent of respondents

Unit Response	32		21		14	
	1	2	1	2	1	2
Yes	75.0	22.2	80.5	16.2	71.4	32.7
No	25.0	77.8	18.2	78.4	21.4	59.2
Don't know/ No reply	-	-	1.3	5.4	7.1	8.2

TABLE 26

QUESTION 5

Q: In your opinion, have any quality circle projects resulted in improvements which have made your job easier?

Run 3 : Percent of all respondents

Response	Unit				
	34	32	21	22	14
Yes	48.5	22.7	47.4	57.5	31.7
No	48.5	72.7	50.0	35.0	54.9
Don't know/ No reply	3.0	4.5	2.6	7.5	13.4

TABLE 27

Run 3 : Differences between quality circle members (1)
and Others (2): Percent of respondents

Unit Response	32		21		14	
	1	2	1	2	1	2
Yes	25.0	22.2	62.3	16.2	60.7	18.4
No	50.0	77.8	35.1	81.1	32.1	73.5
Don't know/ No reply	25.0	0.0	2.6	2.7	7.1	8.2

TABLE 28

QUESTION 13

Q: Management here think quality circles are a good idea.

Run 2 : Percent of respondents

Response Alternative	Unit					
	34	32	21	22	13	14
Strongly agree	10.0	13.3	9.0	8.8	21.6	8.3
Agree	55.0	46.7	52.0	60.0	59.5	36.7
Indifferent/unable to decide	15.0	36.7	17.0	26.2	8.1	40.0
Disagree	10.0	-	12.0	3.8	-	6.7
Strongly disagree	-	-	10.0	1.2	5.4	-
No reply	10.0	3.3			5.4	8.3

Response Alternative	Unit					
	34	32	21	22	13	14
Strongly agree	18.2	40.9	36.8	7.5		14.6
Agree	63.6	40.9	45.6	40.0		50.0
Indifferent	18.2	18.2	14.9	32.5		25.6
Disagree	-	-	1.8	7.5		-
Strongly disagree	-	-	-	5.0		-
No reply	-	-	0.9	7.5		9.8

TABLE 29

QUESTION 13

Q: Management here think quality circles are a good idea.

Differences between quality circle members (1)
and others (2): Percent of respondents - Run 2

Response Alternative Category	Unit			
	34		14	
	1	2	1	2
Strongly agree	6.2	25.0	16.7	2.9
Agree	62.5	25.0	50.0	28.6
Indifferent	18.7	-	20.8	54.3
Disagree	-	50.0	12.5	2.9
Strongly disagree	-	-	-	-
DK/No reply	12.5	-	-	11.4

Differences between quality circle members (1)
and others (2): Percent of respondents - Run 3

Response Category	Unit					
	32		21		14	
	1	2	1	2	1	2
Strongly agree	100.0	27.8	29.9	53.2	14.3	16.3
Agree	-	50.0	51.9	32.4	53.6	53.1
Indifferent	-	22.2	16.9	10.8	25.0	28.6
Disagree	-	-	1.3	2.7	-	-
Strongly disagree	-	-	-	-	-	-
DK/No reply	-	-	-	-	7.1	2.0

**PAGE
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IN
ORIGINAL**

TABLE 30

QUESTION 21

Q: Management do not show enough interest in quality circle projects.

Run 3 : Percent of all respondents

Response Category	Unit				
	34	32	21	22	14
Strongly agree	3.0	9.1	16.7	-	3.7
Agree	12.1	50.0	36.0	17.5	30.5
Indifferent	42.4	13.6	27.2	45.0	29.3
Disagree	30.3	22.7	12.3	22.5	22.0
Strongly disagree	12.1	-	6.1	10.0	6.1
DK/No reply	-	4.5	1.8	5.0	8.5

TABLE 31

Run 3: Differences between quality circle members (1)
and others (2): Percent of respondents

Response Category	14	
	1	2
Strongly agree	7.1	2.0
Agree	28.6	34.7
Indifferent	21.4	34.7
Disagree	28.6	20.6
Strongly disagree	10.7	20.4
DK/No reply	3.6	4.1

TABLE 32

QUESTION 16

Q: Quality circles do not tell non-members enough about their activities.

Response Category	Unit					
	34	32	21	22	13	14
Strongly agree	10.0	16.7	19.0	28.7	32.5	13.3
Agree	45.0	23.3	41.0	47.5	35.1	43.3
Indifferent	25.0	13.3	8.0	12.5	5.4	13.3
Disagree	20.0	20.0	24.0	7.5	10.8	11.7
Strongly disagree	0.0	13.3	4.0	2.5	16.2	8.3
No reply	0.0	13.3	4.0	1.2	0.0	10.0

Response Category	Unit				
	34	32	21	22	14
Strongly agree	3.0	-	5.3	2.5	6.1
Agree	15.2	9.1	19.3	15.0	26.8
Indifferent	3.0	9.1	16.7	20.0	6.1
Disagree	42.4	68.2	41.2	50.0	39.0
Strongly disagree	39.4	13.6	16.7	10.0	14.6
No reply	-	-	0.9	2.5	7.3

TABLE 33

QUESTION 16

Q: Quality circles do not tell non-members enough about their activities.

Differences Between Quality Circle Members (1)
and others (2): Run 2 - Percent of Respondents

Response Category	Unit							
	34		21		22		13	
	1	2	1	2	1	2	1	2
Strongly agree	0.0	50.0	11.8	41.7	11.4	42.2	0.0	55.0
Agree	50.0	25.0	40.8	41.7	57.1	40.0	71.4	15.0
Indifferent	25.0	25.0	10.5	0.0	14.3	11.1	-	-
Disagree	25.0	0.0	28.9	8.3	14.3	2.2	14.3	10.0
Strongly disagree	-	-	5.3	0.0	2.9	2.2	14.3	20.0
DK//No reply	-	-	2.6	8.3	0.0	2.2	-	-

Differences Between Quality Circle Members (1)
and Others (2): Run 3 - Percent of Respondents

Response Category	Unit					
	34		32		14	
	1	2	1	2	1	2
Strongly agree	0.0	5.3	-	-	7.1	6.1
Agree	28.6	0.0	50.0	0.0	35.7	24.5
Indifferent	0.0	5.3	0.0	11.1	14.3	2.0
Disagree	50.0	47.4	50.0	72.2	35.7	42.9
Strongly disagree	21.1	42.1	0.0	16.7	3.6	22.4
DK/No reply	-	-	-	-	3.6	2.0

TABLE 34

QUESTION 19

Q: Operators who are not members of quality circles want to know what the quality circles are doing from week to week.

Run 3: Percent of All Respondents

Response Category	Unit				
	34	32	21	22	14
Strongly agree	18.2	4.5	4.4	7.5	17.1
Agree	48.5	63.6	22.8	30.0	53.7
Indifferent	9.1	18.2	21.9	32.5	13.4
Disagree	24.2	13.6	42.1	22.5	7.3
Strongly Disagree	-	-	7.0	2.5	2.4
DK/No reply	-	-	1.8	5.0	6.1

TABLE 35

Run 3: Differences Between Quality Circle Members (1)
and Others (2): Percent of Respondents

Response Category	Unit					
	34		32		14	
	1	2	1	2	1	2
Strongly agree	7.1	31.6	0.0	18.7	3.6	26.5
Agree	28.6	57.6	20.8	48.7	57.1	55.1
Indifferent	21.4	0.0	45.8	12.5	21.4	10.2
Disagree	42.9	10.5	29.2	12.5	7.1	8.2
Strongly disagree	-	-	4.2	0.0	7.1	0.0
DK/No reply	-	-	0.0	12.5	3.6	0.0

TABLE 36

Q: The presence of quality circles in a unit makes jobs more secure.

Run 2: Percent of Respondents

Response Alternative	Unit					
	34	32	21	22	13	14
Strongly agree	-	-	4.0	-	-	-
Agree	25.0	13.3	15.0	8.7	21.6	21.7
Indifferent	35.0	36.7	18.0	22.5	18.9	35.0
Disagree	25.0	30.0	42.0	38.8	18.9	28.3
Strongly disagree	15.0	16.7	17.0	30.0	37.8	8.3
No reply		3.3		-	2.8	6.7

Run 3: Percent of Respondents

Response Category	Unit				
	34	32	21	22	14
Strongly agree	3.0	-	7.0	2.5	1.2
Agree	9.1	18.2	24.6	-	6.1
Indifferent	42.4	45.5	25.4	15.0	30.5
Disagree	39.4	31.8	32.5	77.5	52.4
Strongly Disagree	6.1	4.5	8.8	2.5	4.9
DK/No reply	-	-	1.8	2.5	4.9

TABLE 37

Q: The presence of quality circles in a unit makes jobs more secure.

Differences Between Quality Circle Members (1)
and Others (2): Runs 2 and 3 Percent of Respondents

Response Category						
	14(2)		14(3)		21(3)	
	1	2	1	2	1	2
Strongly agree	-	-	3.6	0.0	6.5	8.1
Agree	29.2	17.1	7.1	6.1	32.5	8.1
Indifferent	37.5	34.3	42.9	24.5	31.2	13.5
Disagree	16.7	37.1	39.3	65.3	26.0	45.9
Strongly disagree	16.7	2.9	7.1	4.1	2.6	21.6
DK/No reply	0.0	8.6	-	-	1.3	2.7

TABLE 38

QUESTION 20

Q: Membership of a quality circle improves changes of promotion.

Response Alternative	Unit					
	34	32	21	22	13	14
Strongly agree	-	-	1.0	2.5	-	-
Agree	10.0	3.3	15.0	15.0	21.6	3.3
Indifferent	40.0	40.0	25.0	15.0	21.6	31.7
Disagree	45.0	33.3	36.0	43.8	13.5	46.7
Strongly disagree	5.0	20.0	20.0	23.7	43.3	11.7
No reply	-	3.3	-	-	-	6.7

Run 3: Percent of Respondents

Response Alternative	Unit				
	34	32	21	22	14
Strongly agree	3.0	4.5	4.4	-	2.4
Agree	6.1	4.5	14.9	2.5	2.4
Indifferent	15.2	13.6	24.6	17.5	19.5
Disagree	51.5	54.5	39.5	47.5	50.0
Strongly disagree	24.2	18.2	14.9	30.0	19.5
No reply	-	4.5	1.8	2.5	6.1

TABLE 39

QUESTION 20

Q: Membership of a quality circle improves chances of promotion.

Differences Between Quality Circle Members (1)
and Others (2): Run 2 - Percent of Respondents

Response Category	Unit	
	14	
	1	2
Strongly agree	0.0	5.7
Agree	-	-
Indifferent	16.7	42.9
Disagree	62.5	37.1
Strongly disagree	20.8	5.7
DK/No reply	0.0	8.6

Differences Between Quality Circle Members (1)
and Others (2): Run 3 - Percent of Respondents

Response Category	Unit					
	34		21		14	
	1	2	1	2	1	2
Strongly agree	0.0	10.5	1.3	0.8	0.0	4.1
Agree	14.3	0.0	14.3	16.2	0.0	2.0
Indifferent	7.1	21.1	27.3	18.9	17.9	22.4
Disagree	42.9	57.9	40.3	37.8	46.4	57.1
Strongly disagree	35.7	10.5	16.9	10.8	32.1	14.3
DK/No reply	-	-	0.0	5.4	3.6	0.0

TABLE 40

QUALITY CIRCLE OBJECTIVES (% OF RESPONDENTS)

Q: "What do you think quality circles hope to achieve?"

Run 2

Unit	34	32	21	22	13	14	Overall
Solve work problems	95.0	89.6	96.8	85.5	82.9	92.5	1
Increase output	80.0	62.1	81.4	53.9	60.0	75.5	5
Improve relationships ..	65.0	44.8	67.2	43.4	54.3	52.8	9
Reduce costs	90.0	65.5	84.7	72.4	71.4	67.9	4
Improve quality	85.0	75.9	96.3	88.2	85.7	92.5	2
Improve operating procedures	85.0	65.5	79.7	59.2	57.1	71.7	6
Increase job awareness	65.0	58.6	73.4	59.2	65.7	56.6	8
Improve reject rates	90.0	58.6	82.3	69.7	71.4	84.9	3
Increase job satisfaction	75.0	55.2	72.8	59.2	65.7	60.4	7
Other	-	3.5	10.9	11.8	11.4	5.7	10

TABLE 40 (continued)

Run 3

Unit	34	32	21	22	13	14	Overall
Solve work problems	87.5	95.2	95.6	97.4		81.1	1
Increase output	68.7	76.2	63.7	64.1		56.8	6
Improve relationships . .	25.0	61.9	57.5	35.9		37.8	9
Reduce costs	81.2	71.4	73.5	53.8		62.2	5
Improve quality	87.5	85.7	93.8	71.8		83.8	2
Improve operating procedures	68.7	76.2	66.4	66.7		73.0	4
Increase job awareness	59.4	57.1	73.5	64.1		41.9	7
Improve reject rates	75.0	81.0	85.0	56.4		77.0	3
Increase job satisfaction	40.6	52.4	56.6	43.6		47.3	8
Other	6.2	9.5	12.4	7.7		2.7	10

APPENDIX 10

INTERVIEW DATA

ATTITUDE DIMENSIONS
TECHNICAL STAFFS AND MIDDLE MANAGERS

HIGH

LOW

TASK

EXTENSIVE KNOWLEDGE OF CURRENT QC PROJECTS
PERCEIVED QC ACHIEVEMENT
MENTION OF DIRECT BENEFITS OF QC ACTIVITY
EMPHASIS ON PROBLEM-SOLVING POTENTIAL

LITTLE KNOWLEDGE OF CURRENT QC PROJECTS
LITTLE OR NO PERCEIVED QC ACHIEVEMENT
MENTION OF INDIRECT BENEFITS OF QC ACTIVITY
OR NO BENEFITS FROM QC ACTIVITY
NO PROBLEM-SOLVING POTENTIAL

HIGH

LOW

INTEREST

EXTENSIVE KNOWLEDGE OF QC ACTIVITY
COHERENT OPINIONS HELD AND FREELY EXPRESSED
LONG INTERVIEW
SOME KNOWLEDGE OF QC CONCEPT IN GENERAL

LITTLE KNOWLEDGE OF QC ACTIVITY
FEW OPINIONS OR UNWILLINGNESS TO EXPRESS OPINIONS
SHORT OR STRAINED INTERVIEW
LITTLE KNOWLEDGE OF QC CONCEPT IN GENERAL

ATTITUDE DIMENSIONS
TECHNICAL STAFFS AND MIDDLE MANAGERS

(CONTINUED)

HIGH

INVOLVEMENT

LOW

HAS ATTENDED A QC MEETING
HAS ATTENDED A QC PRESENTATION
HAS CONTRIBUTED DIRECTLY TO A QC PROJECT

HAS NEVER ATTENDED A QC MEETING
HAS NEVER ATTENDED A QC PRESENTATION
HAS NEVER CONTRIBUTED TO QC PROJECT

HIGH

CONTROL

LOW

MENTION OF BENEFITS FOR MANAGEMENT FROM QC ACTIVITY
INVOLVEMENT FOR PERSONAL RATHER THAN QC BENEFIT
FEEDS IN SPECIFIC PROBLEMS TO QC
MANIPULATION OF RESULTS FOR OWN BENEFIT

NO MENTION OF MANAGEMENT BENEFITS FROM QC ACTIVITY
MENTION OF BENEFITS FOR QC FROM QC ACTIVITY
INVOLVEMENT IN QC ACTIVITY FOR BENEFIT OF QC
NO ATTEMPT TO INFLUENCE SELECTION OF QC PROJECTS
NO ATTEMPTS TO MANIPULATE QC RESULTS

APPENDIX 10
INTERVIEW DATA

TABLE 41

MANAGEMENT INTERVIEWS - TASK DIMENSION

1982 (Run 1)

Unit	Task	Non-Task
21	6	4
22	5	5
Total	11	9

1983 (Run 2)

Unit	Task	Non-Task
34	7	7
32	4	2
21	7	4
22	5	5
13	8	1
14	2	6
Total	33	25

1984 (Run 3)

Unit	Task	Non-Task
34	5	2
32	3	1
21	13	5
22	2	4
13	-	-
14	7	3
Total	30	15

TABLE 42**MANAGEMENT INTERVIEWS - INTEREST DIMENSION****1982**

	Low Interest	High Interest
21	7	3
22	4	6
Total	11	9

1983

	Low Interest	High Interest
34	6	8
32	1	5
21	8	3
22	4	6
13	6	3
14	2	6
Total	27	31

1984

	Low Interest	High Interest
34	5	2
32	2	2
21	9	9
22	3	3
13	-	-
14	4	6
Total	23	22

TABLE 43**MANAGEMENT INTERVIEWS - INVOLVEMENT DIMENSION****1982**

	High Involvement	Low Involvement
21	3	7
22	7	3
Total	10	10

1983

	High Involvement	Low Involvement
34	7	7
32	1	5
21	8	3
22	6	4
13	4	5
14	6	2
Total	32	26

1984

	High Involvement	Low Involvement
34	2	5
32	2	2
21	14	4
22	4	2
13	-	-
14	6	4
Total	28	17

TABLE 44**MANAGEMENT INTERVIEWS - CONTROL DIMENSION**

1982

	Control	Non-Control
21	1	9
22	-	10
Total	1	19

1983

	Control	Non-Control
34	-	14
32	-	6
21	2	9
22	-	10
13	1	8
14	-	8
Total	3	55

1984

	Control	Non-Control
34	1	6
32	-	4
21	3	15
22	2	4
13	-	-
14	2	8
Total	8	37

TABLE 45**MANAGEMENT ATTITUDES - APPROVAL****1982**

	For	Against
21	3	7
22	8	2
Total	11	9

1983

	For	Against
34	9	5
32	6	-
21	4	7
22	10	-
13	4	5
14	7	1
Total	40	19

1984

	For	Against
34	3	4
32	2	2
21	10	8
22	3	3
13	-	-
14	6	4
Total	24	21

TABLE 46

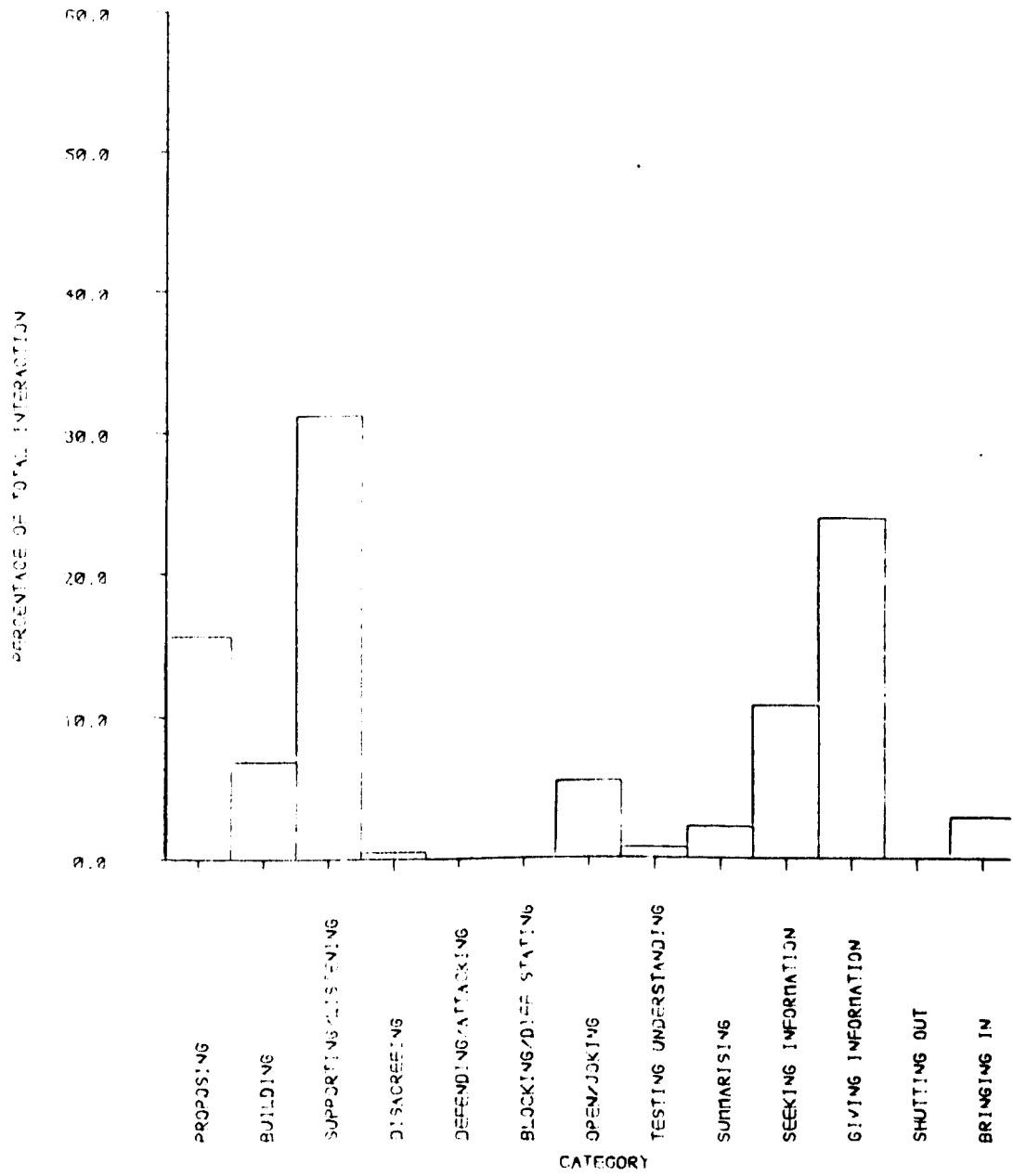
QUALITY CIRCLE OBJECTIVES RANGED IN ORDER OF USEFULNESS

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
1. Cost control/reduction	15.6	22.2	24.4	13.3	4.4	4.4	-	2.2	6.7	2.2	2.2	-	2.2	99.8
2. Quality improvement	24.4	26.7	20.0	13.3	4.4	4.4	2.2	-	2.2	2.2	-	-	-	99.8
3. Work pace to schedule	-	-	-	4.4	4.4	2.2	4.4	8.9	15.6	20.0	17.8	17.8	4.4	99.9
4. Output increased	-	-	8.9	13.3	11.1	15.6	13.3	8.9	6.7	11.1	4.4	2.2	4.4	99.9
5. Down time minimised	-	-	-	-	-	8.9	11.1	15.6	17.8	13.3	17.8	13.3	2.2	100.0
6. Operator efficiency improved	-	-	4.4	11.1	11.1	13.3	8.9	6.7	13.3	11.1	6.7	-	13.3	99.9
7. Targets met	-	-	-	-	-	-	-	-	-	2.2	11.1	40.0	46.7	100.0
8. Motivation of work-force	17.8	22.2	17.8	15.6	11.1	2.2	6.7	4.4	2.2	-	-	-	-	100.0
9. Training of work-force	13.3	20.0	11.1	13.3	15.6	8.9	2.2	2.2	2.2	2.2	4.4	2.2	2.2	99.8
10. Good relations between work areas	2.2	2.2	2.2	6.7	13.3	11.1	11.1	15.6	15.6	13.3	2.2	2.2	2.2	99.9
11. Good relations between shop-floor and management	11.1	17.8	24.4	20.0	4.4	2.2	-	2.2	4.4	13.3	-	-	-	99.8
12. Good customer relations	-	-	13.3	17.8	15.6	15.6	22.2	13.3	-	-	2.2	-	-	100.0
13. Innovation/new ideas	8.9	8.9	6.7	22.2	13.3	15.6	8.9	-	4.4	-	4.4	2.2	4.4	99.9

APPENDIX 11

PATTERNS OF INTERACTION

**BROKEN TEXT AND SOME
POOR QUALITY IMAGES IN
ORIGINAL THESIS.**

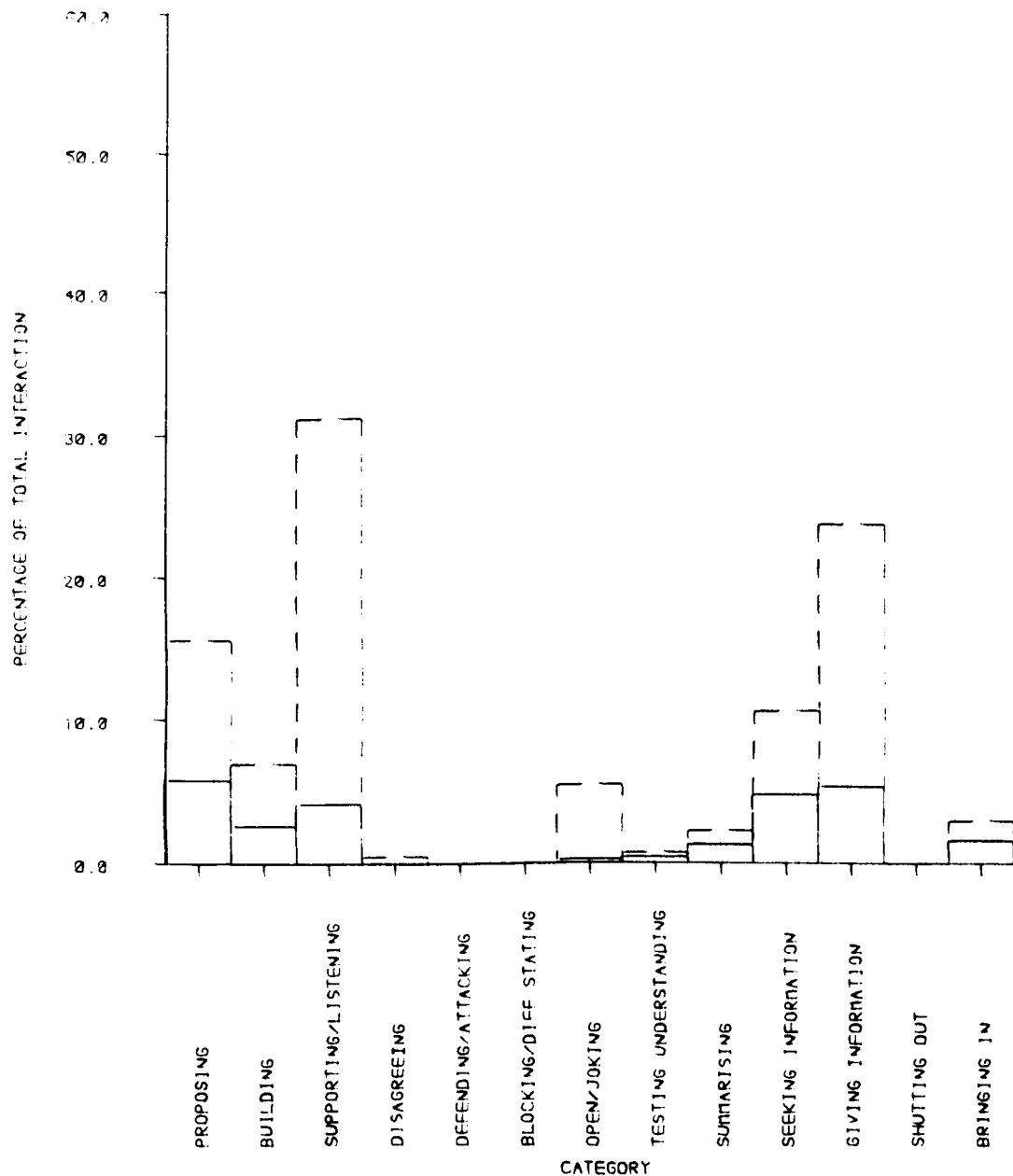


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

METALLISING AND BRAZING AT FDD
 24.11.92
 9
 55

PATTERN OF INTERACTION FOR WHOLE GROUP

11.2 PATTERN OF INTERACTION



DATA

QUALITY CIRCLE

DATE

NO OF PARTICIPANTS

DURATION

METALLISING AND BRAZING AT EDD

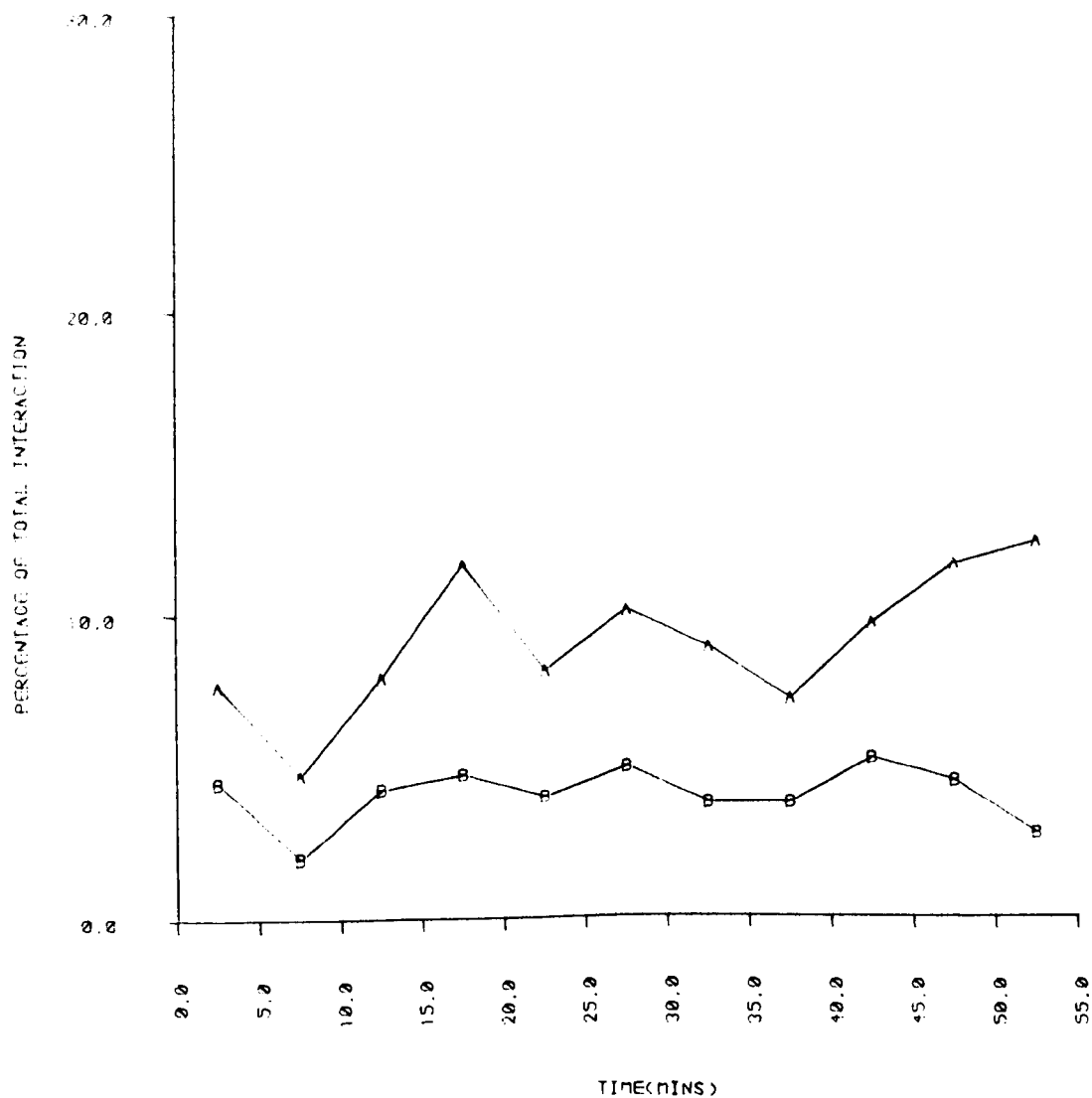
24.3.92

9

55

PATTERN OF INTERACTION FOR LEADER

11.3

PATTERN OF INTERACTION
METALLISING AND BRAZING AT EDDDATA

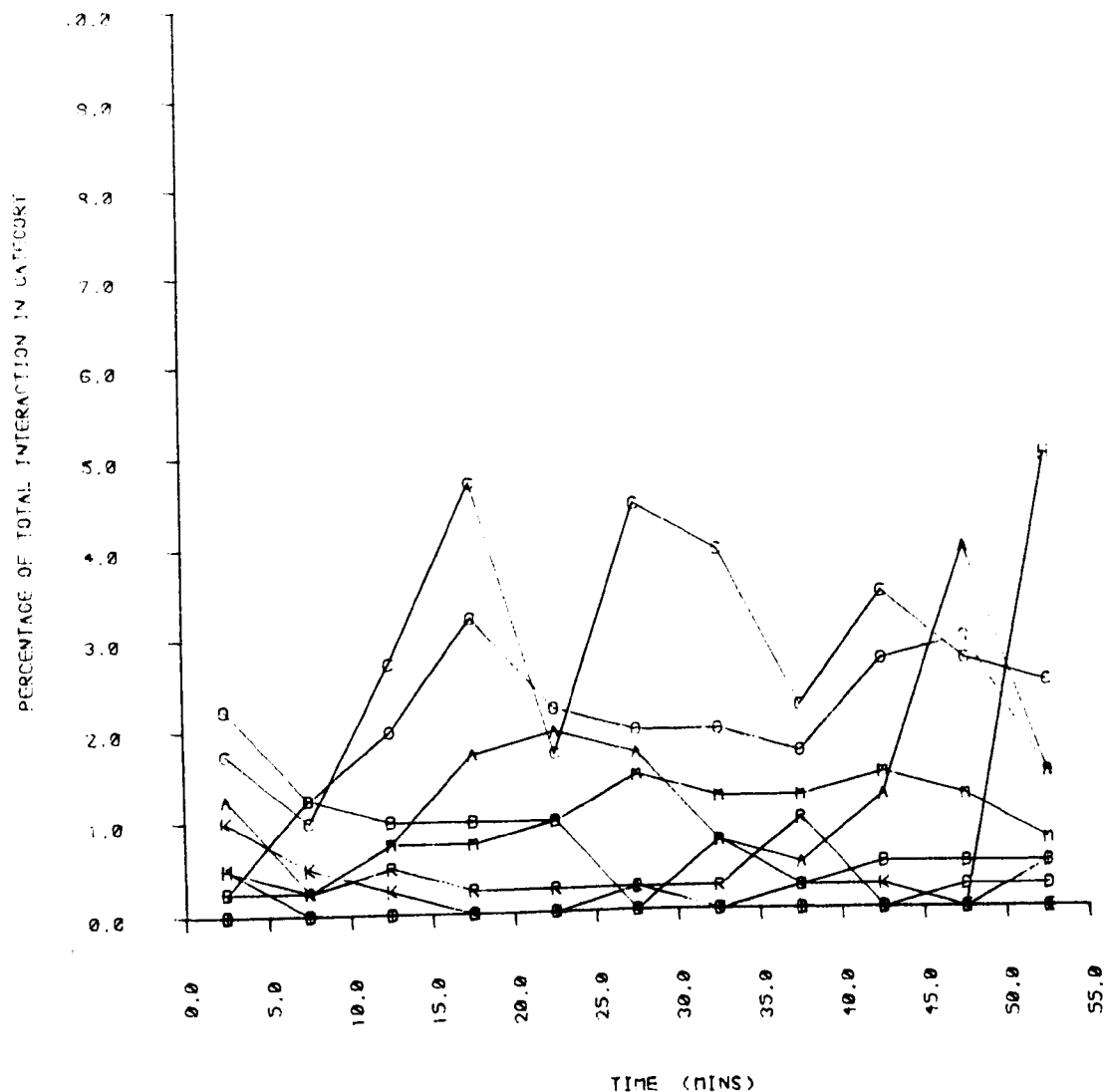
DATE	24.3.92
NO OF PARTICIPANTS	9
DURATION	55

LEGEND

A	WHOLE GROUP
B	LEADER

11.4

PATTERN OF INTERACTION FOR WHOLE GROUP METALLICITY AND BRAZING AT EDD



DATA

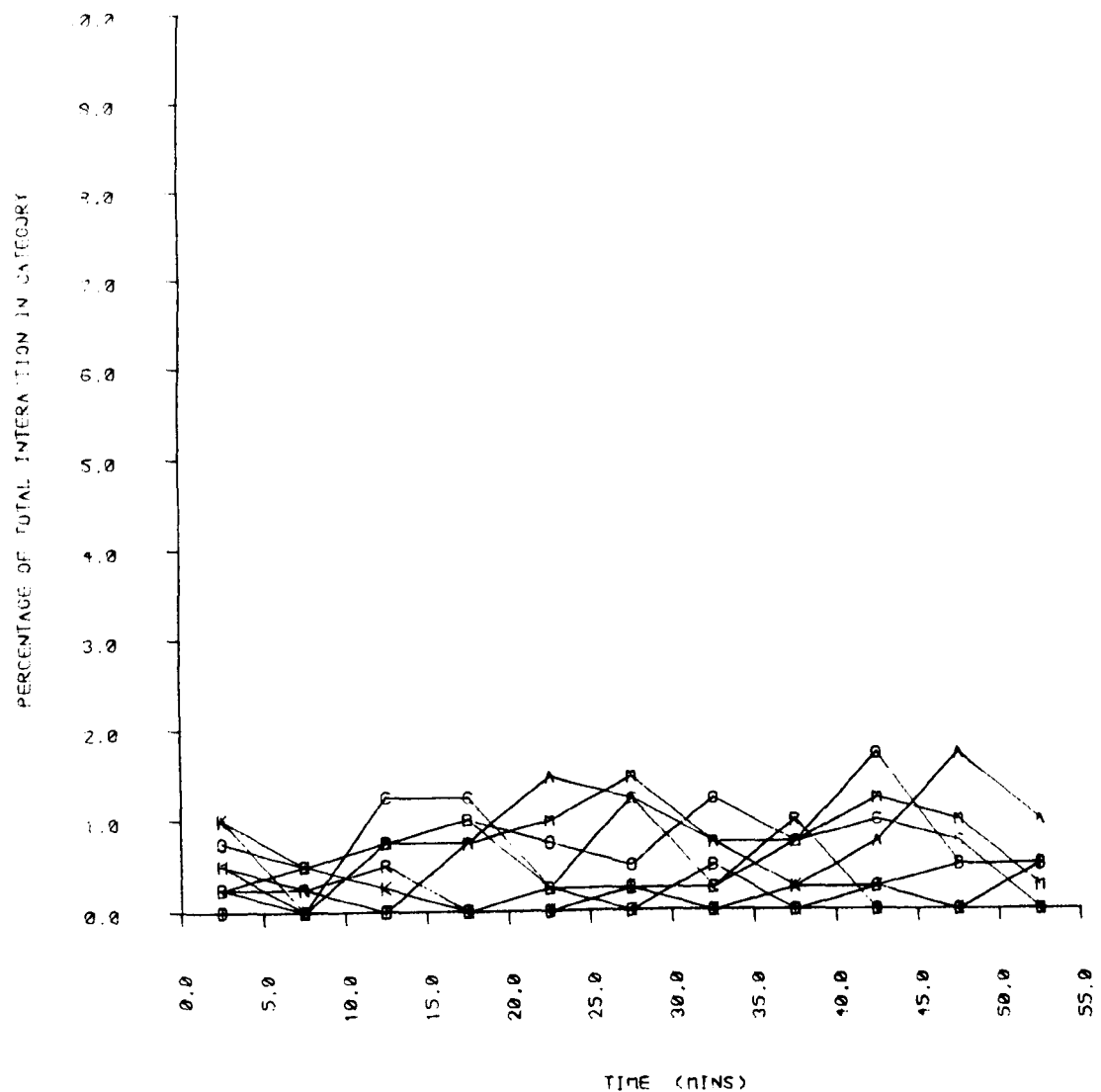
DATE 24.3.82
NO OF PARTICIPANTS 9
DURATION 55

LEGEND

A PROPOSING
B BUILDING
C SUPPORTING/LISTENING
D DISAGREEING
E DEFENDING/ATTACKING
G BLOCKING/DIFF STATING
H OPEN/JOKING
I TESTING UNDERSTANDING
K SUMMARISING
N SEEKING INFORMATION
O GIVING INFORMATION
P SHUTTING OUT
R BRINGING IN

11.5

PATTERN OF INTERACTION FOR LEADER METALLISING AND BRAZING AT EDD



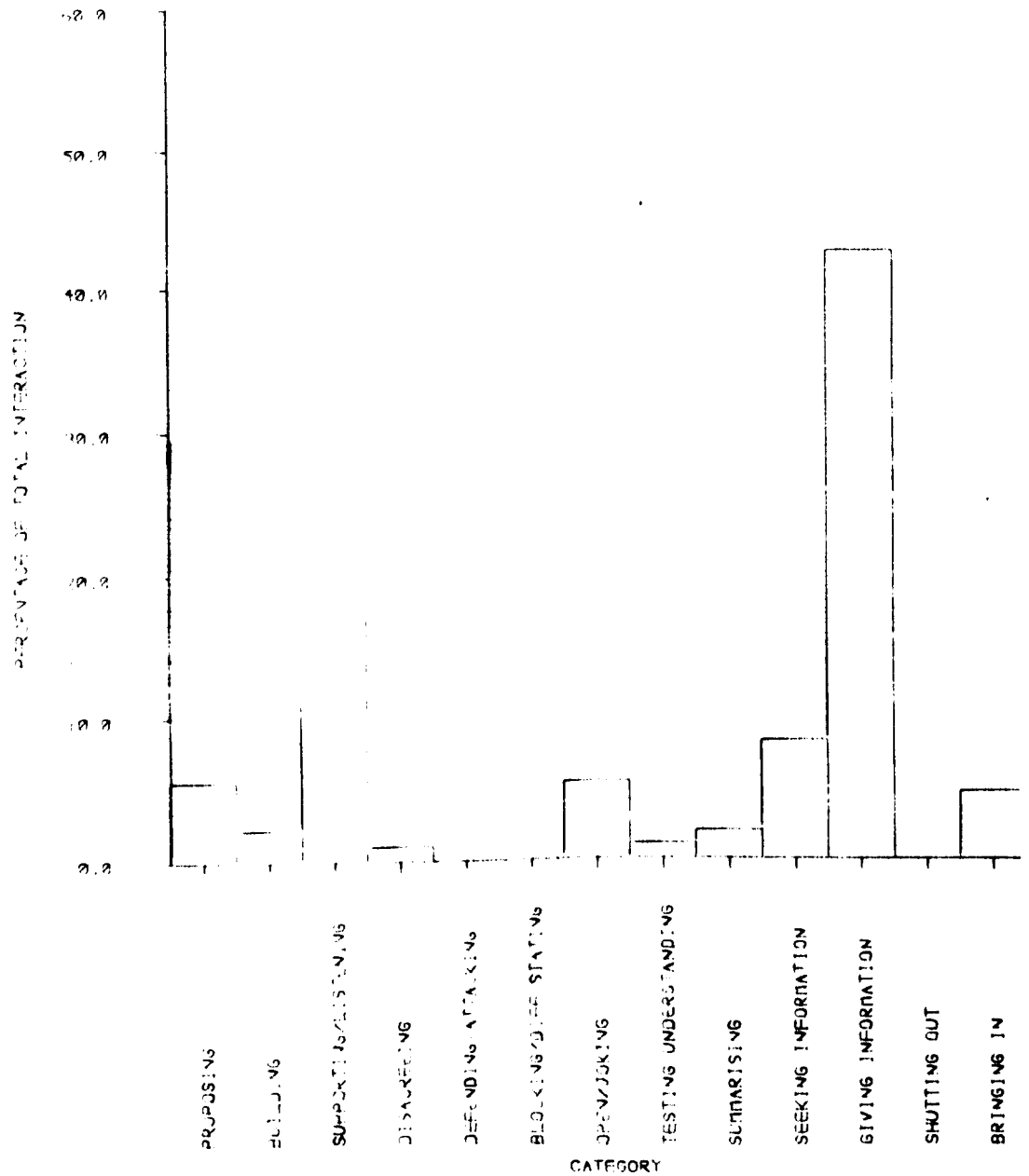
DATA

DATE 24.3.92
NO OF PARTICIPANTS 9
DURATION 55

LEGEND

A PROPOSING
B BUILDING
C SUPPORTING/LISTENING
D DISAGREEING
E DEFENDING/ATTACKING
G BLOCKING/DIFF STATING
H OPEN/JOKING
I TESTING UNDERSTANDING
K SUMMARISING
M SEEKING INFORMATION
O GIVING INFORMATION
P SHUTTING OUT
R BRINGING IN

11.6

PATTERN OF INTERACTION

DATA

QUALITY CIRCLE

DATE

NO OF PARTICIPANTS

DURATION

METALLISING AND BRAZING AT EDD

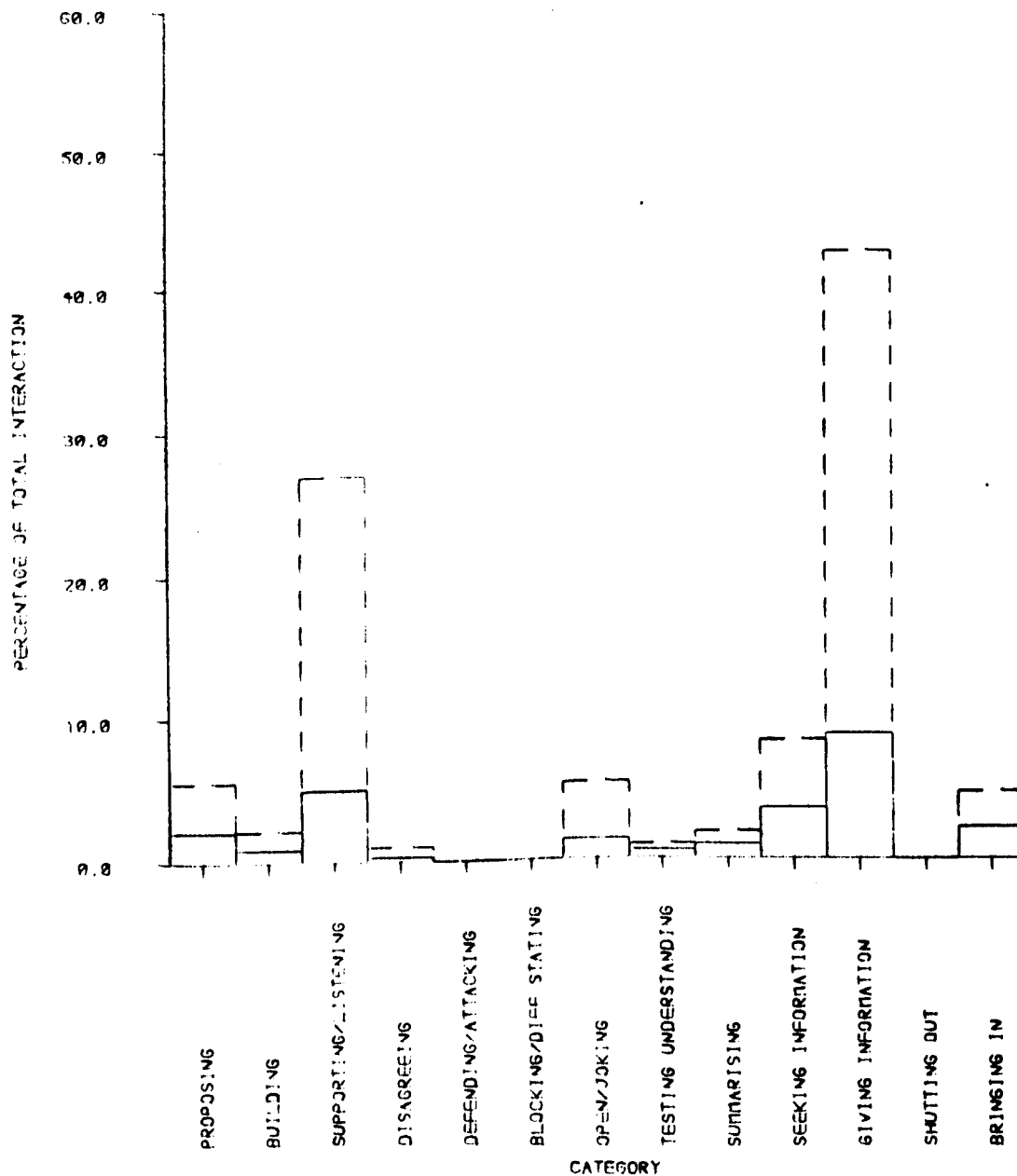
16.1.93

9

60

PATTERN OF INTERACTION FOR WHOLE GROUP

11.7 PATTERN OF INTERACTION

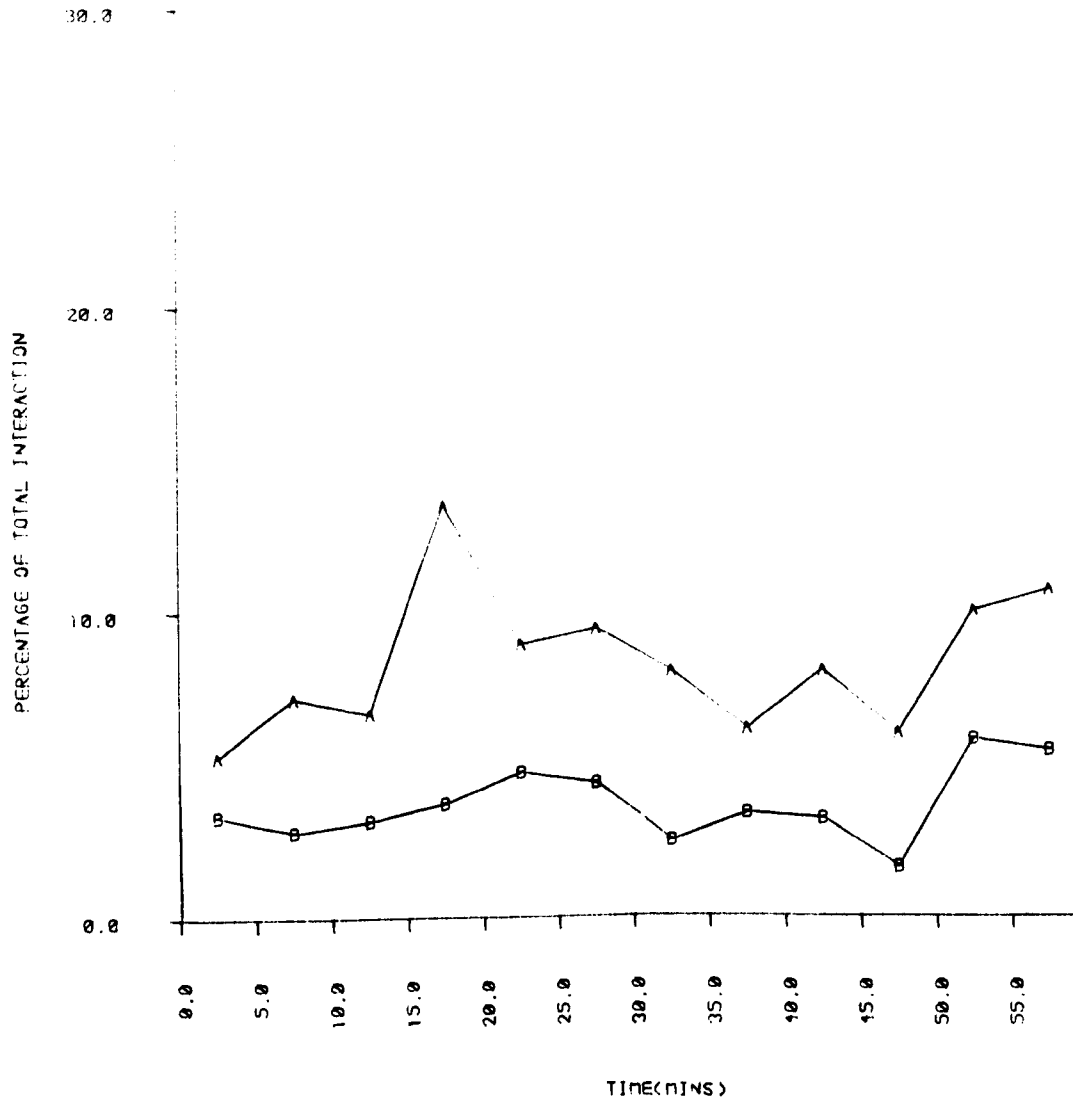


DATA
QUALITY CIRCLE
DATE
NO OF PARTICIPANTS
DURATION

METALLISING AND BRAZING AT EDD
16.3.83
8
60

PATTERN OF INTERACTION FOR LEADER

11.8 PATTERN OF INTERACTION METALLISING AND BRAZING AT EDD



DATA

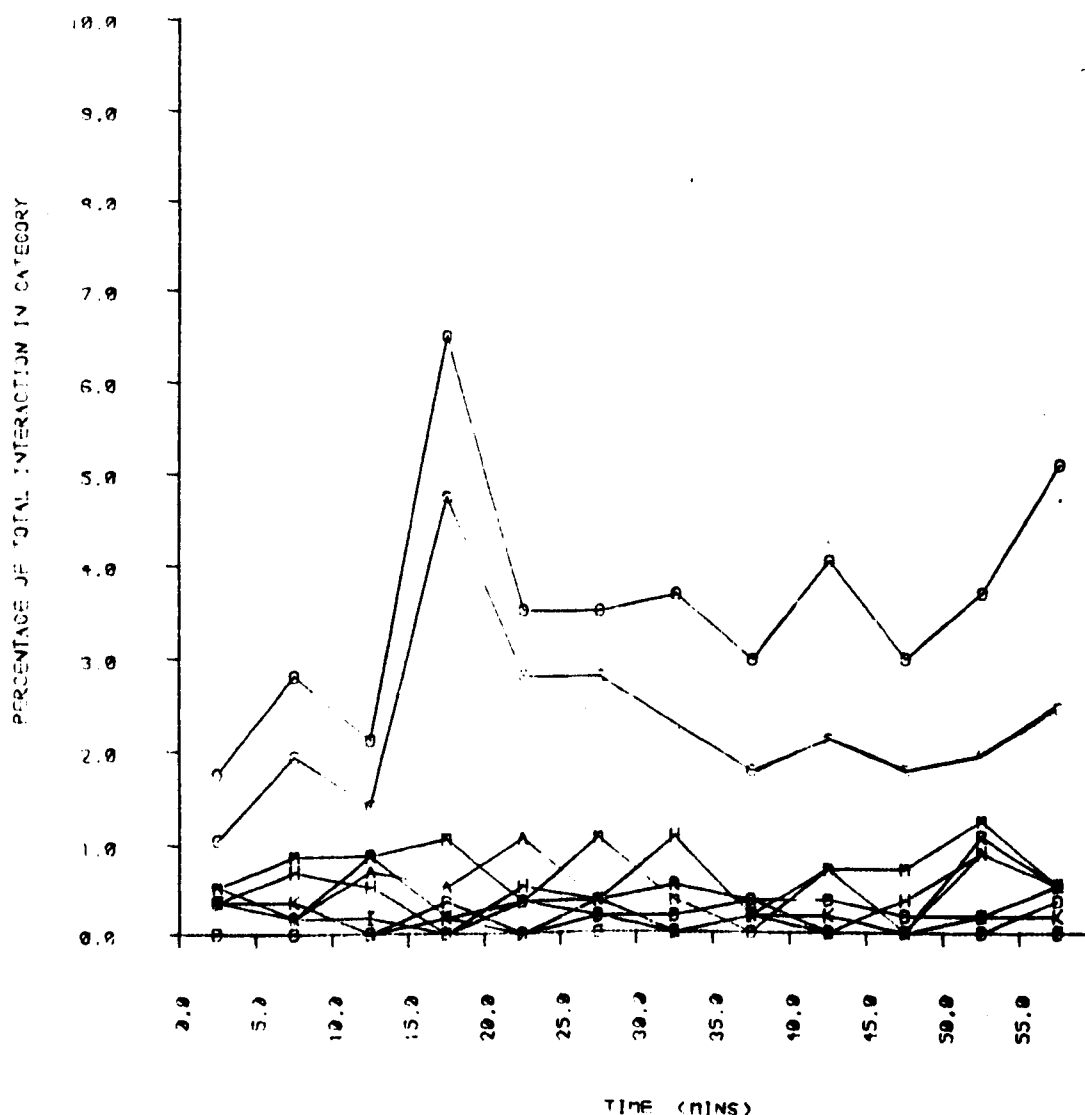
DATE 16.3.93
NO OF PARTICIPANTS 8
DURATION 60

LEGEND

A WHOLE GROUP
B LEADER

11.9

PATTERN OF INTERACTION FOR WHOLE GROUP METALLISING AND BRAZING AT EDD



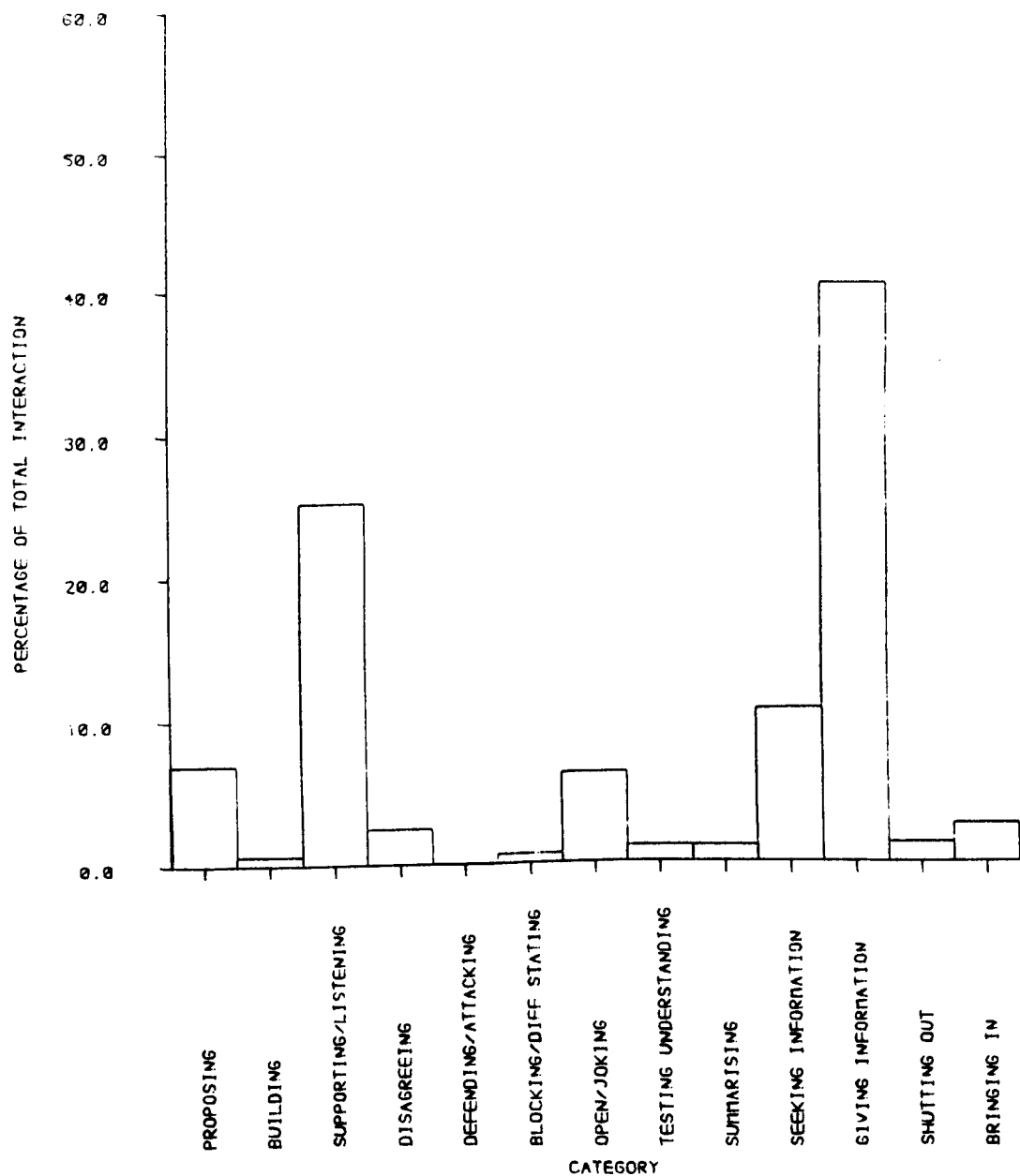
DATA

DATE 16.3.93
NO OF PARTICIPANTS 8
DURATION 60

LEGEND

A PROPOSING
B BUILDING
C SUPPORTING/LISTENING
D DISAGREEING
E DEFENDING/ATTACKING
F BLOCKING/DIFF STATING
G OPEN/JOKING
H TESTING UNDERSTANDING
I SUMMARISING
J SEEKING INFORMATION
K GIVING INFORMATION
L SHUTTING OUT
M BRINGING IN

11.10 PATTERN OF INTERACTION

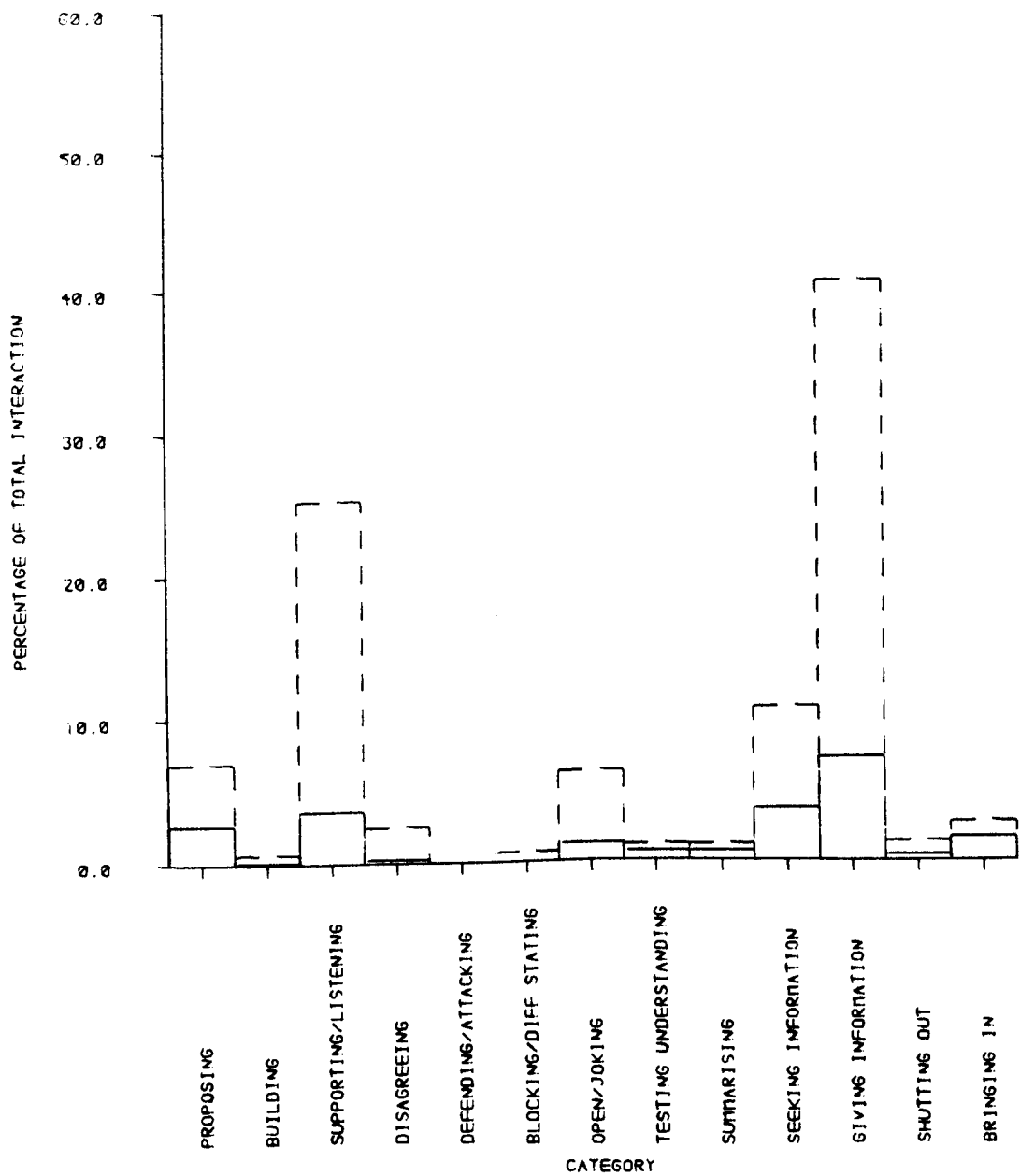


DATA
QUALITY CIRCLE
DATE
NO OF PARTICIPANTS
DURATION

ACCOUNTS AT ETD
21.3.94
5
15

PATTERN OF INTERACTION FOR WHOLE GROUP

11.11 PATTERN OF INTERACTION

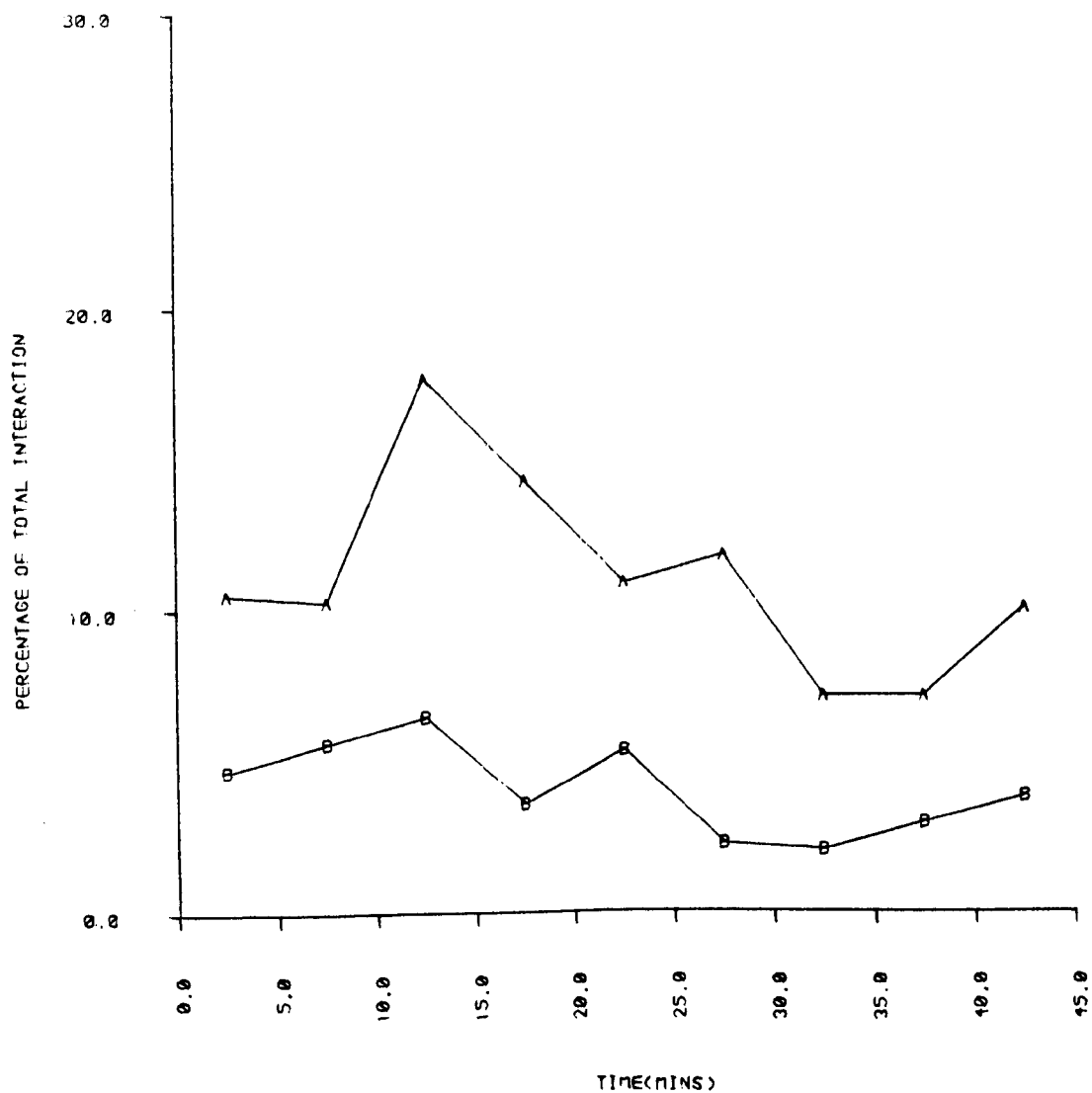


DATA
QUALITY CIRCLE
DATE
NO OF PARTICIPANTS
DURATION

ACCOUNTS AT ETD
21.3.84
5
45

PATTERN OF INTERACTION FOR LEADER

11.12 PATTERN OF INTERACTION
ACCOUNTS AT ETD



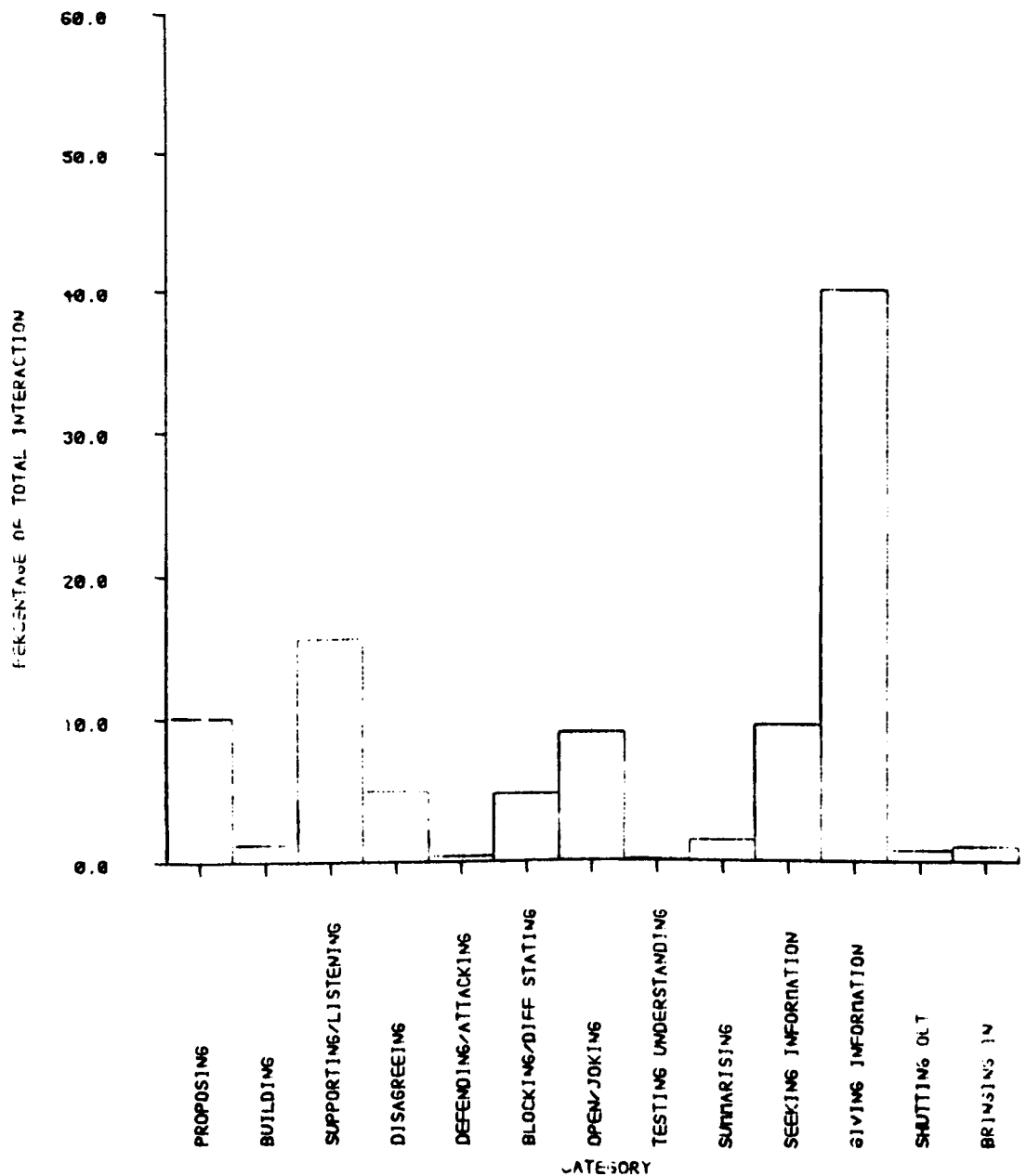
DATA

DATE 21.3.84
NO OF PARTICIPANTS 5
DURATION 15

LEGEND

A WHOLE GROUP
B LEADER

11.13 PATTERN OF INTERACTION

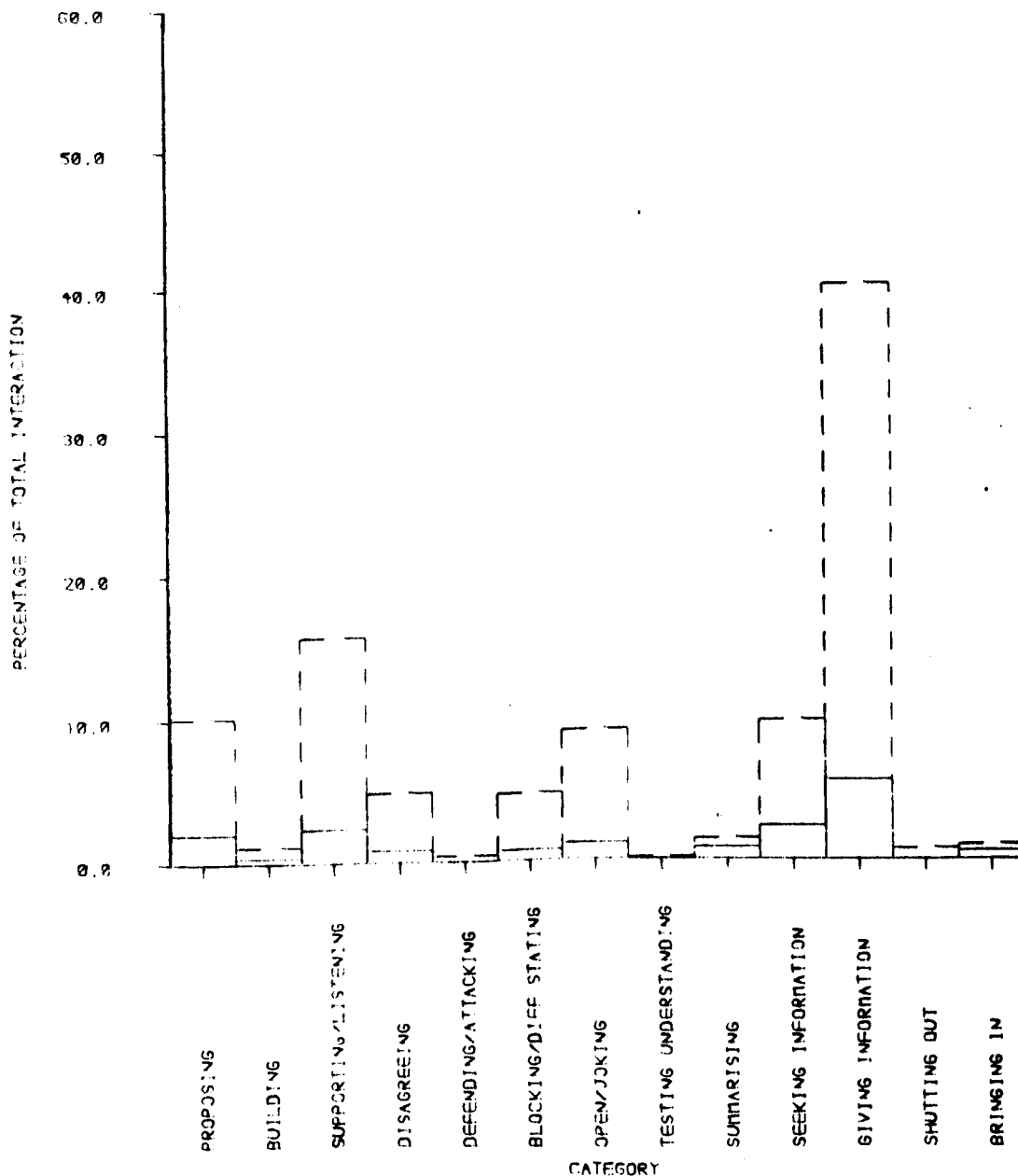


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

TEST HOUSE AT TANTALUM CAPACITORS
 24.3.83
 6
 55

PATTERN OF INTERACTION FOR WHOLE GROUP

1114 PATTERN OF INTERACTION

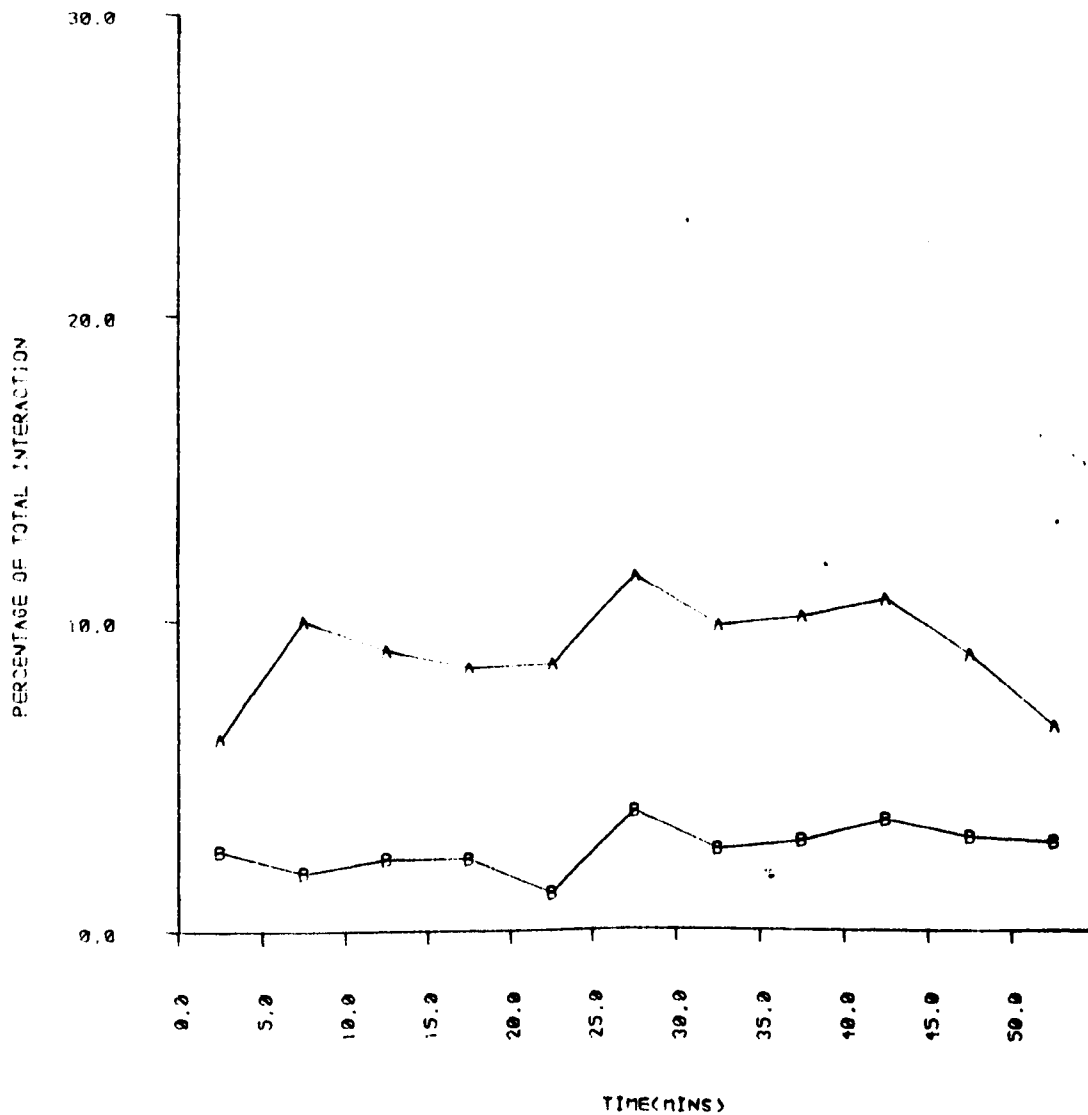


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

TEST HOUSE AT TANTALUM CAPACITORS
 24.3.93
 6
 55

PATTERN OF INTERACTION FOR LEADER

11.15 PATTERN OF INTERACTION TEST HOUSE AT TANTALUM CAPACITORS



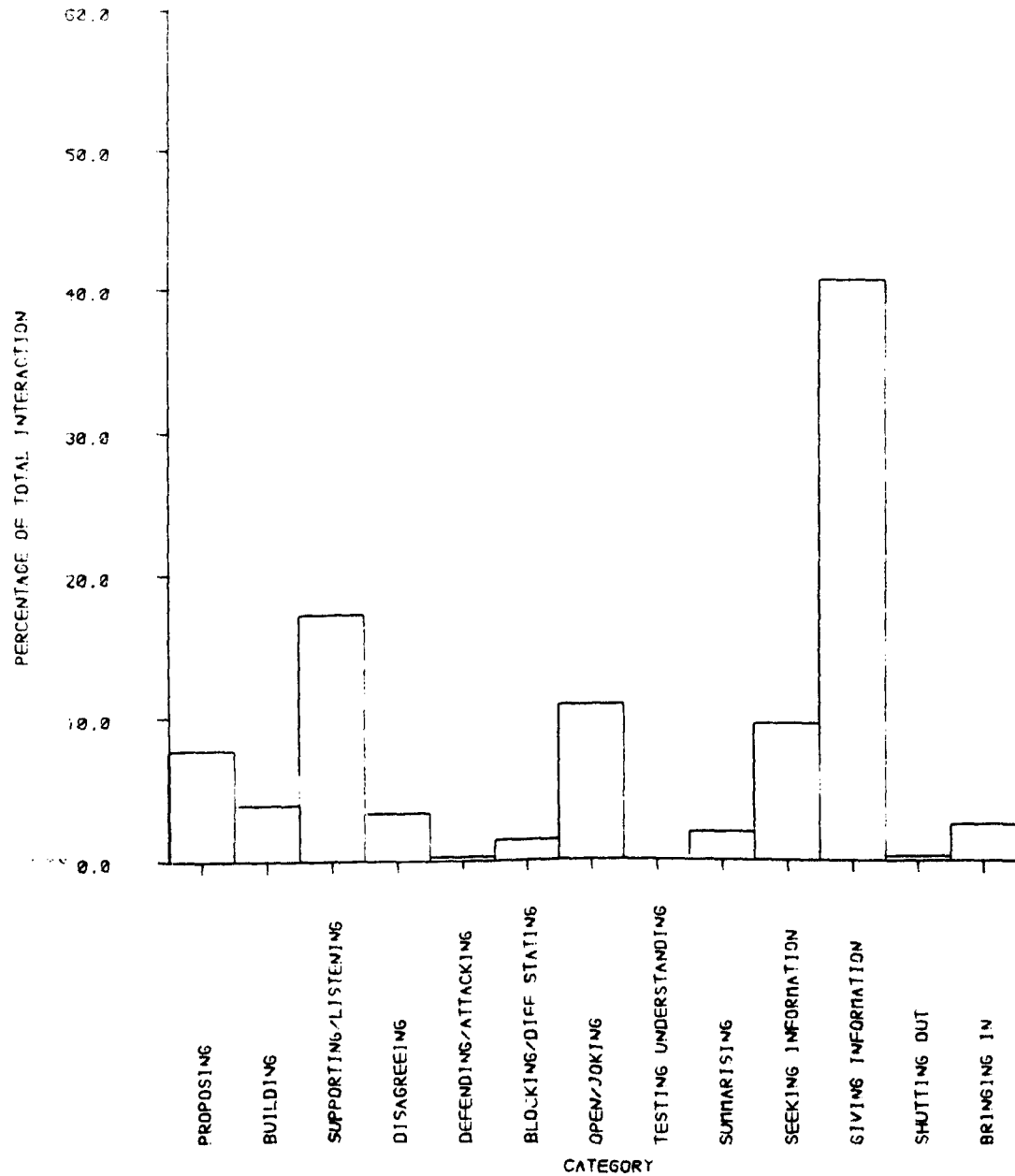
DATA

DATE 24.3.83
NO OF PARTICIPANTS 6
DURATION 55

LEGEND

A WHOLE GROUP
B LEADER

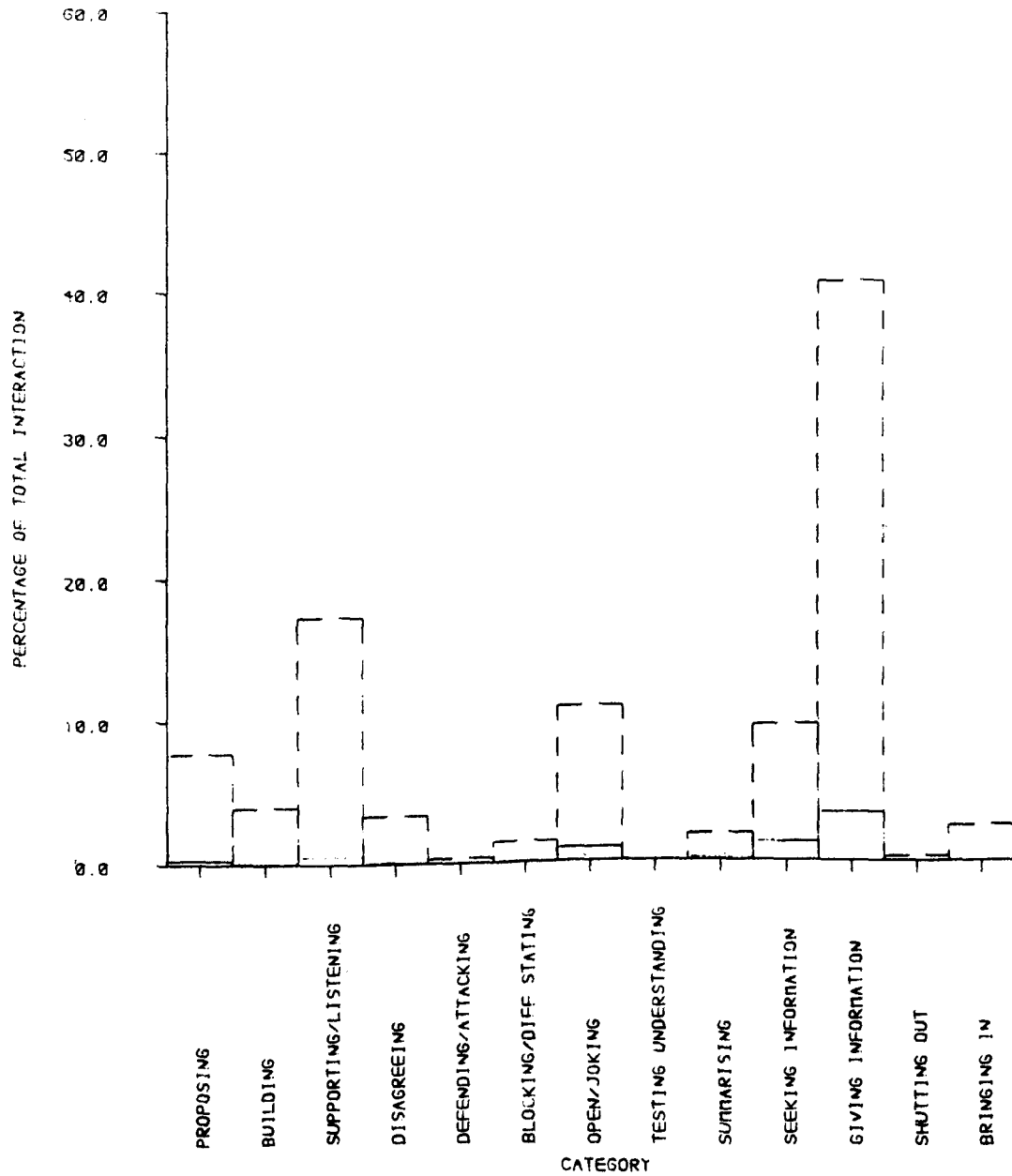
11.16 PATTERN OF INTERACTION



DATA	
QUALITY CIRCLE	LIMITER 1 AT EDD
DATE	1.4.92
NO OF PARTICIPANTS	7
DURATION	70

PATTERN OF INTERACTION FOR WHOLE GROUP

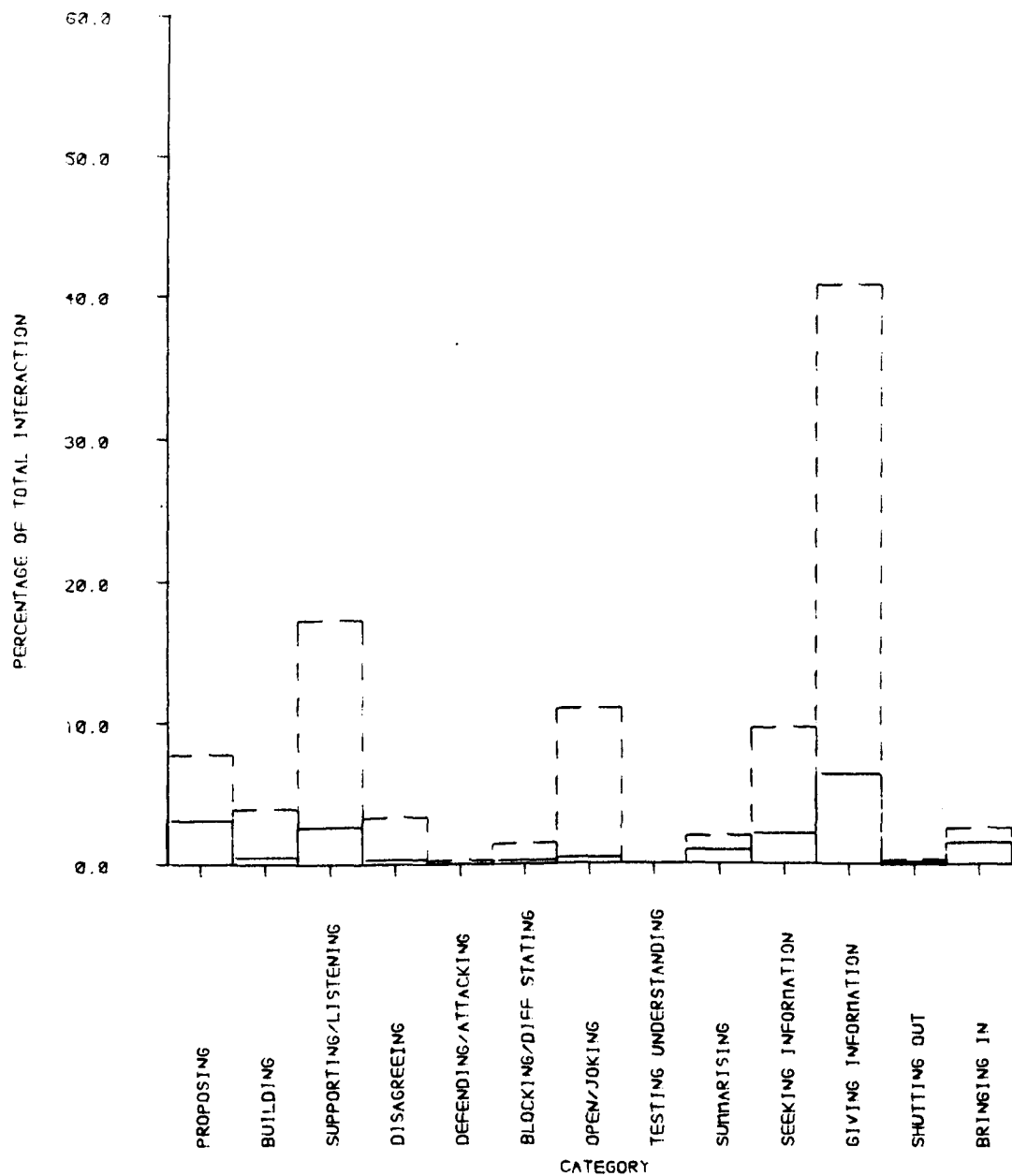
11.17 PATTERN OF INTERACTION



DATA	
QUALITY CIRCLE	LIMITER 1 AT EDD
DATE	1.4.82
NO OF PARTICIPANTS	7
DURATION	70

PATTERN OF INTERACTION FOR LEADER

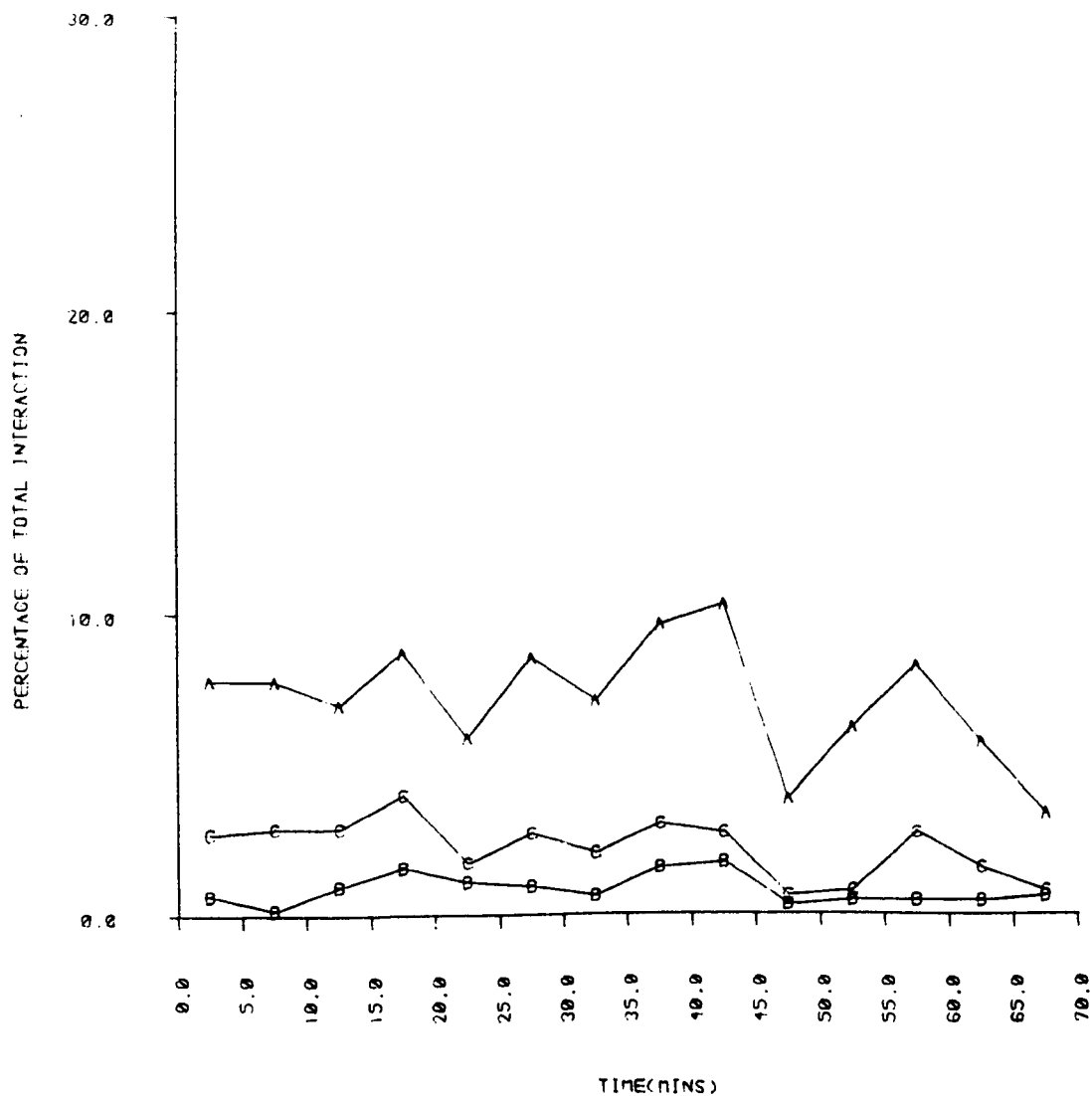
11.18 PATTERN OF INTERACTION



DATA	
QUALITY CIRCLE	LIMITEE 1 AT EDD
DATE	1.4.82
NO OF PARTICIPANTS	7
DURATION	70

PATTERN OF INTERACTION FOR ENGINEER MBR

11.19 PATTERN OF INTERACTION LIMITER 1 AT EDD



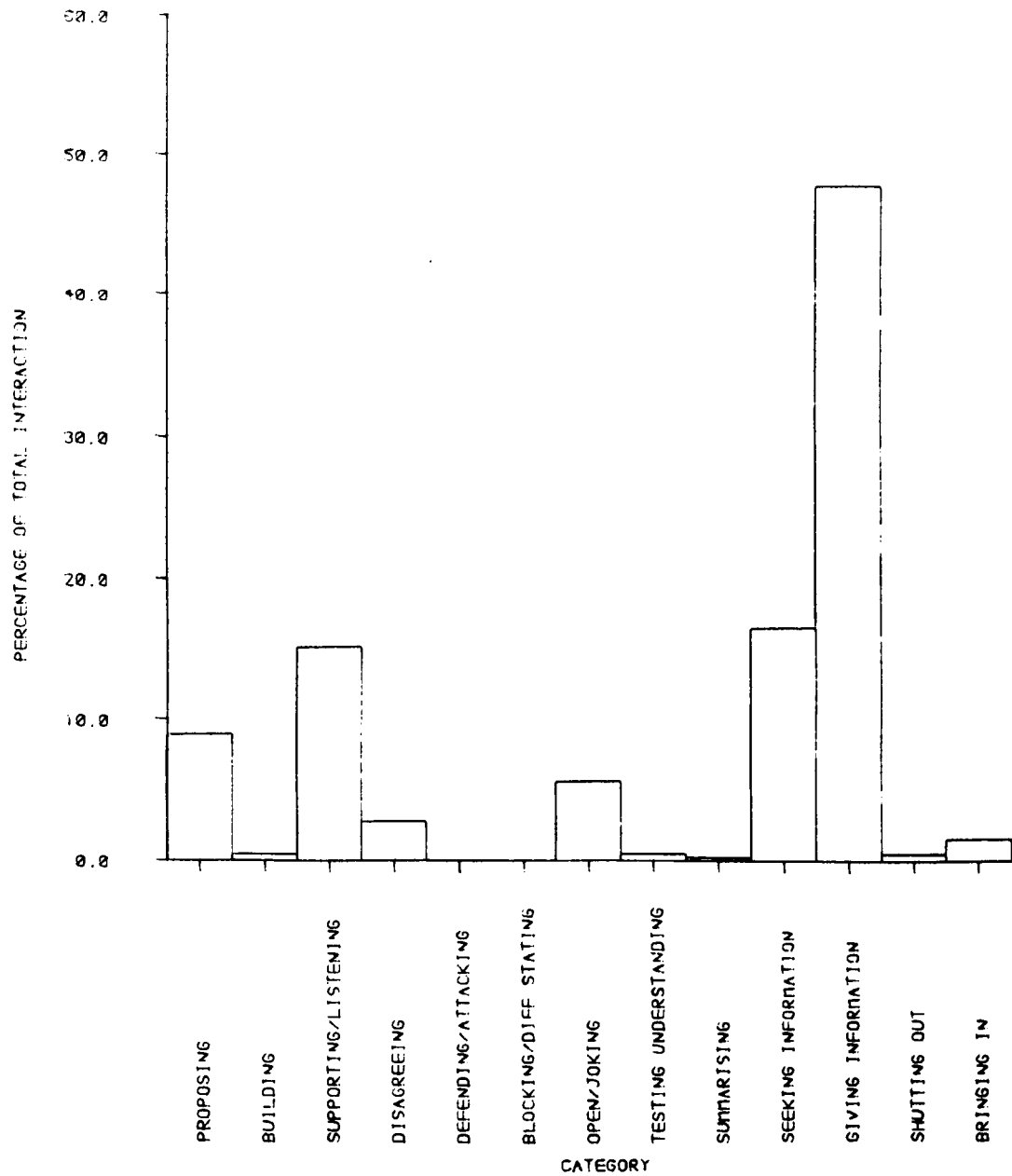
DATA

DATE 1.4.82
NO OF PARTICIPANTS 7
DURATION 70

LEGEND

A WHOLE GROUP
B LEADER
C ENGINEER NBR

1120 PATTERN OF INTERACTION

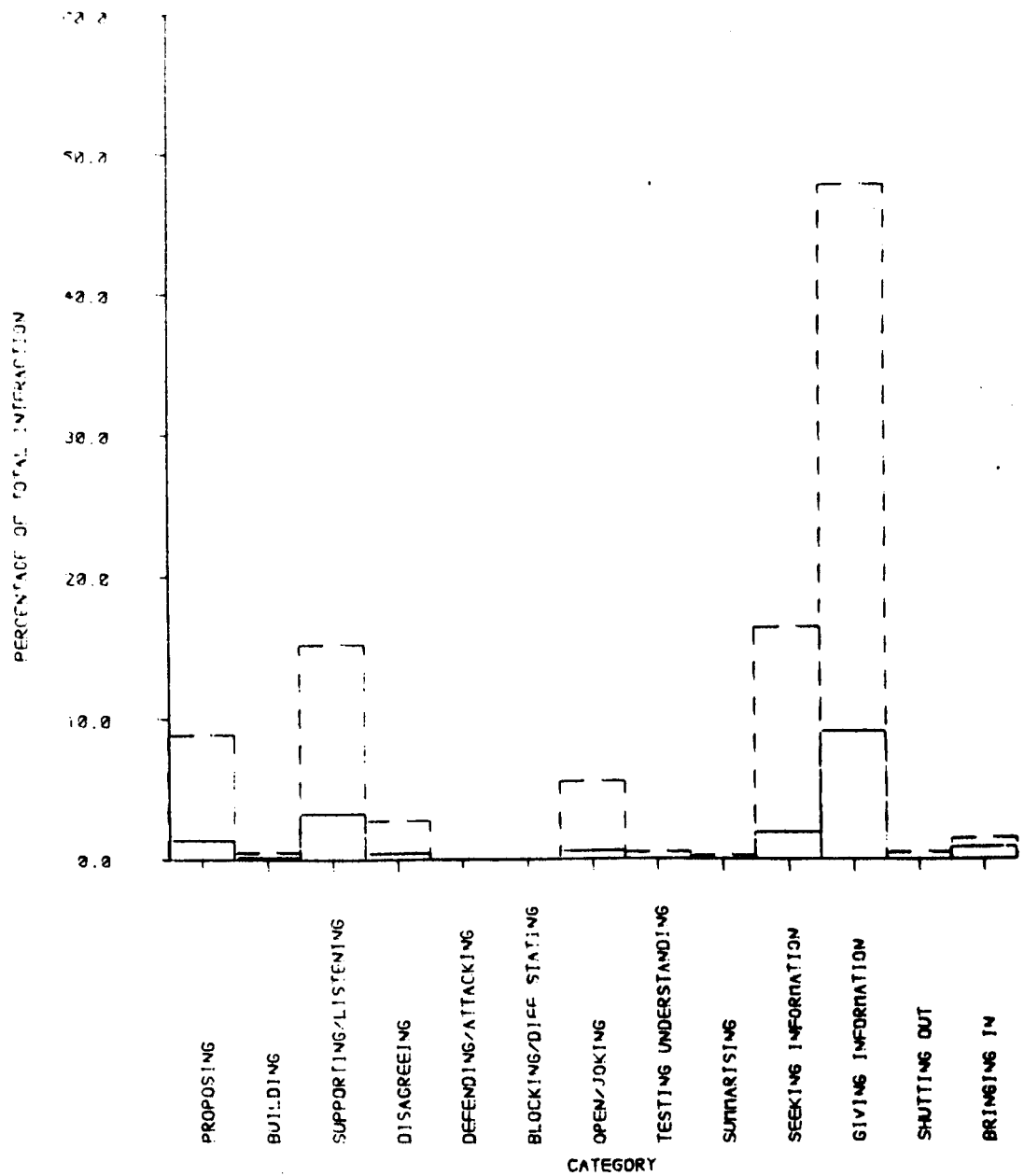


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

MAIN CROSS
 17.11.94
 4
 55

PATTERN OF INTERACTION FOR WHOLE GROUP

11.21 PATTERN OF INTERACTION

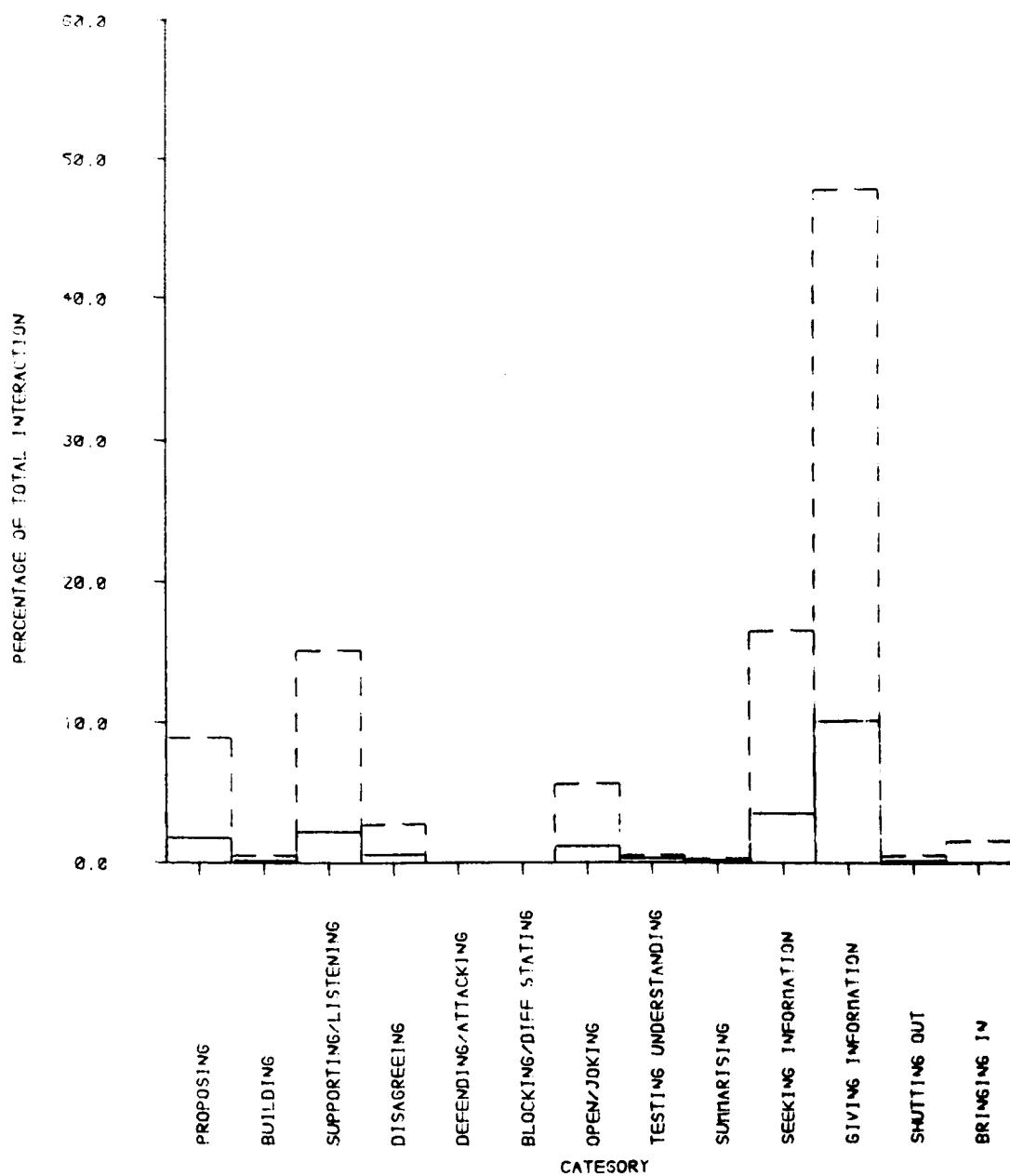


DATA
QUALITY CIRCLE
DATE
NO OF PARTICIPANTS
DURATION

MAIN CROSS
17.1.94
4
55

PATTERN OF INTERACTION FOR LEADER

11.22 PATTERN OF INTERACTION

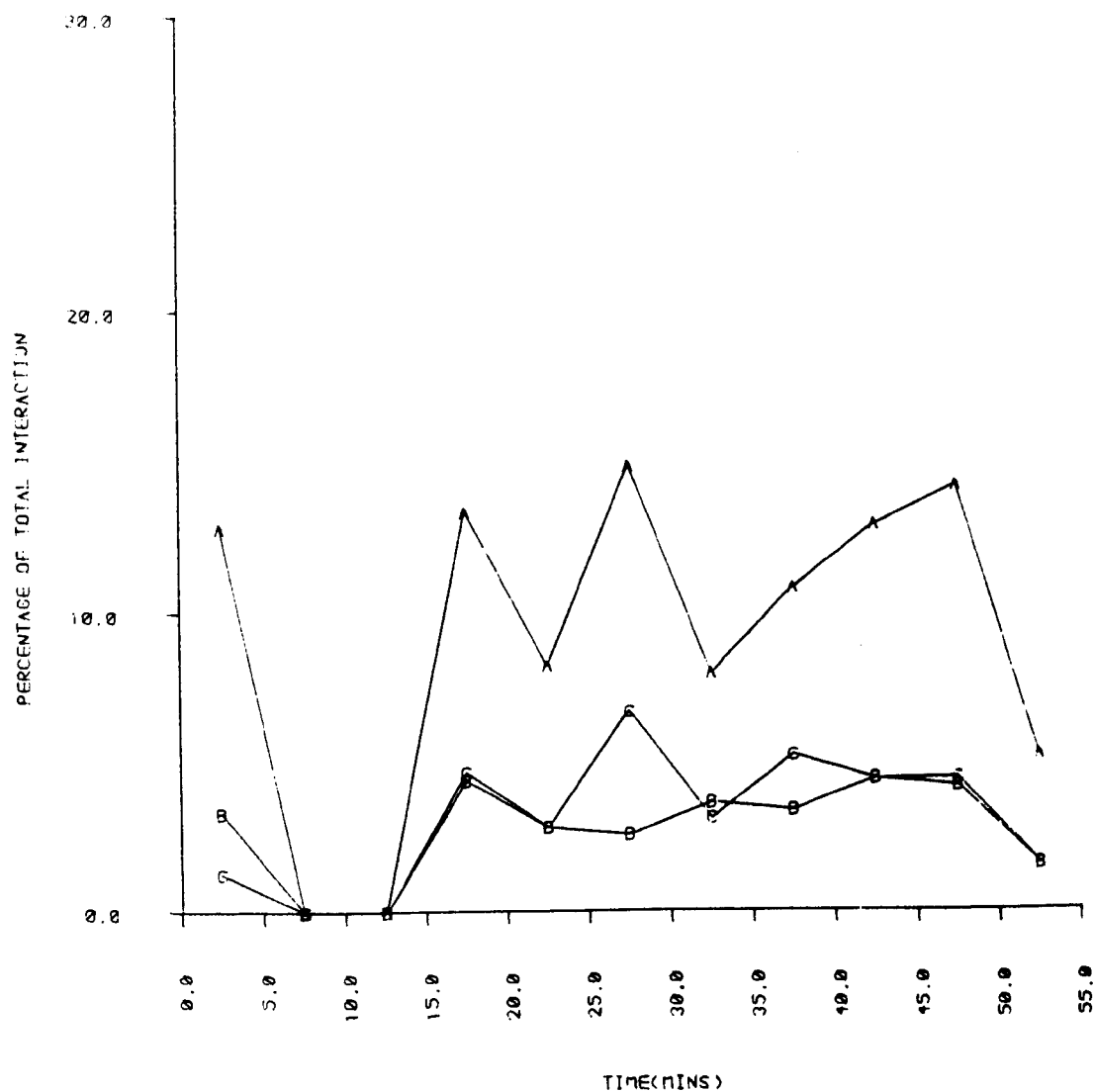


DATA
QUALITY CIRCLE
DATE
NO OF PARTICIPANTS
DURATION

MAIN CROSS
17.1.89
4
55

PATTERN OF INTERACTION FOR MEMBER

11.23 PATTERN OF INTERACTION MAIN CROSS



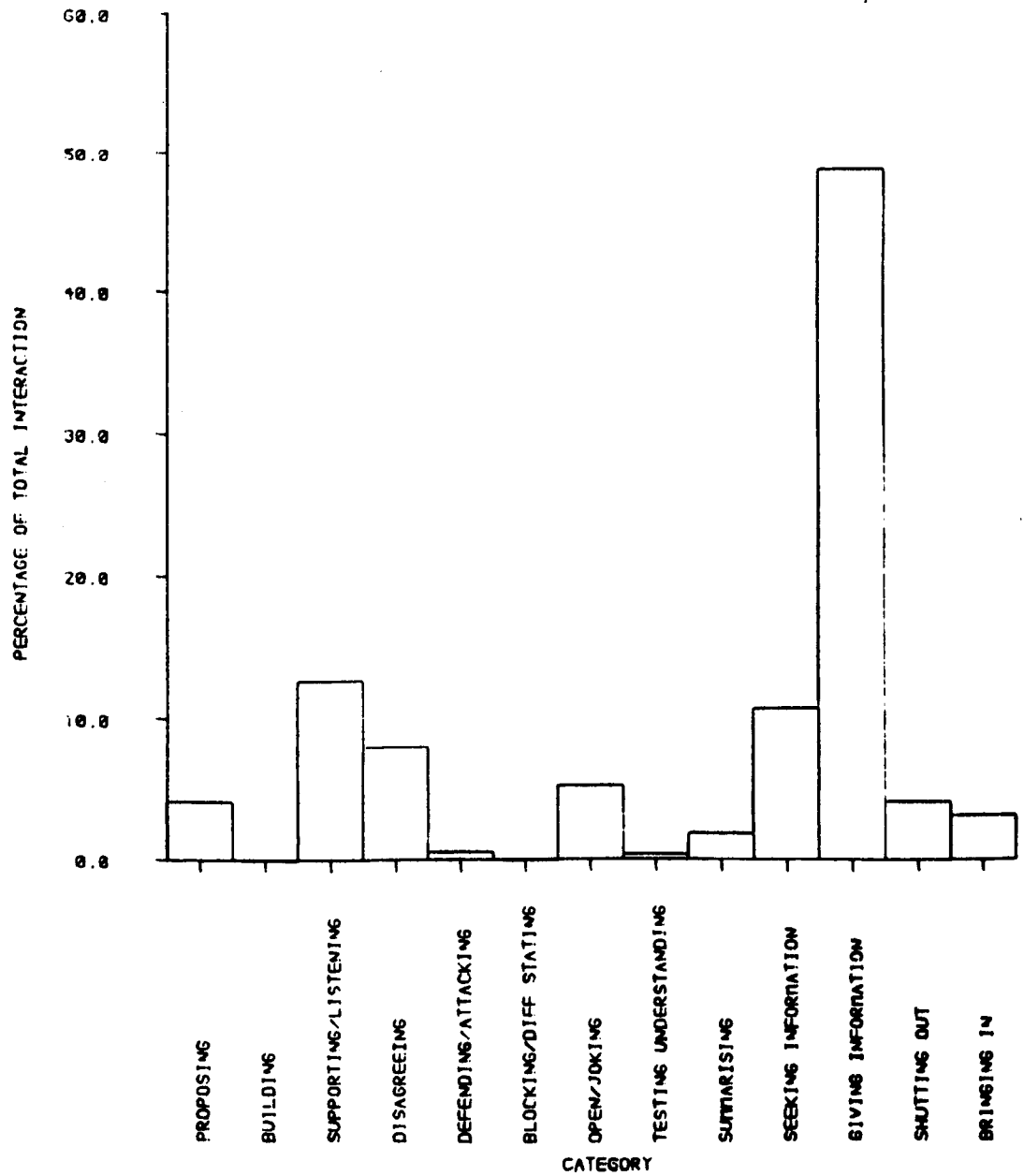
DATA

DATE 17.11.84
NO OF PARTICIPANTS 4
DURATION 55

LEGEND

A WHOLE GROUP
B LEADER
C MEMBER

1124 PATTERN OF INTERACTION

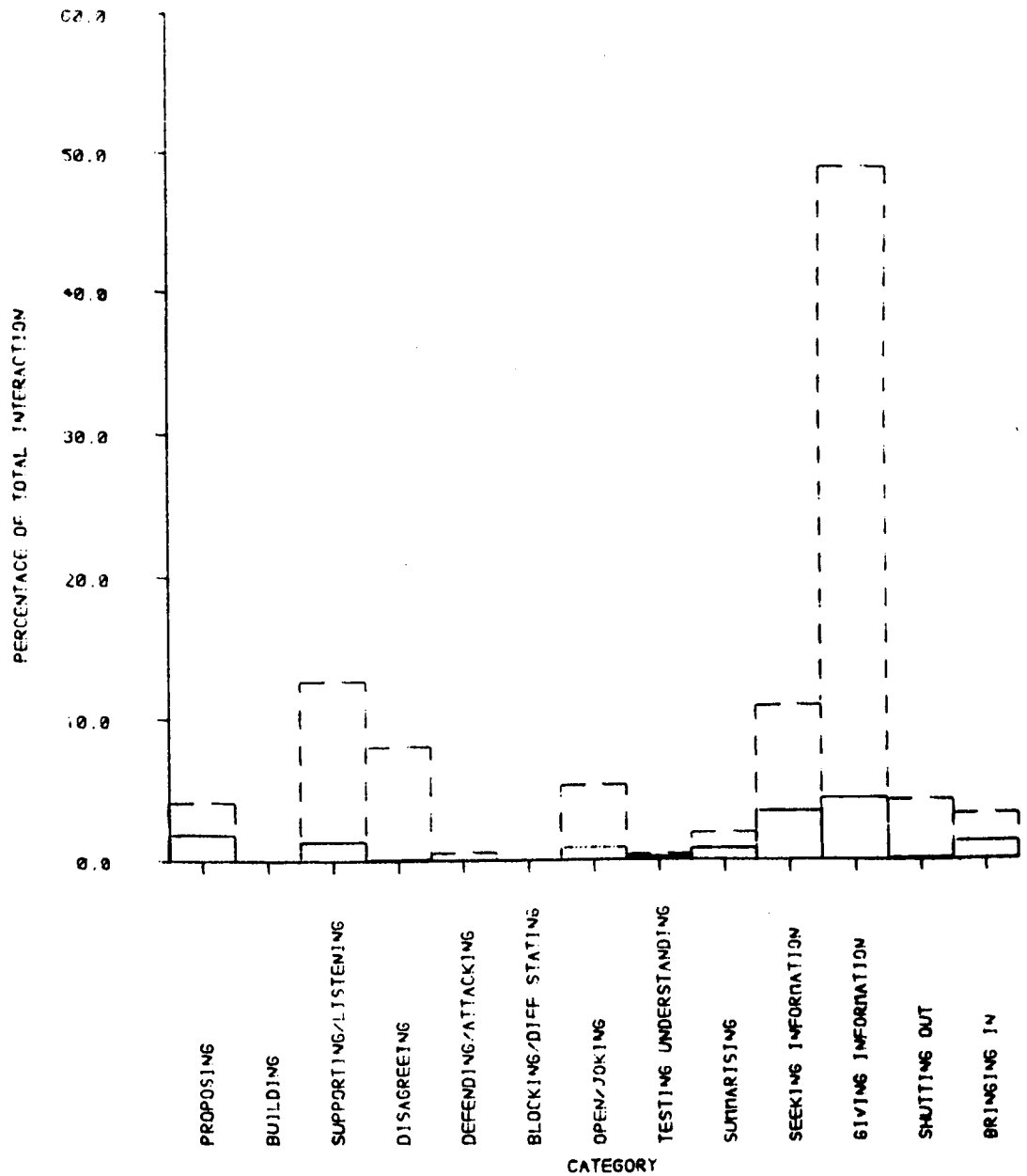


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

TCXO AT QUARTZ CRYSTAL
 31.1.91
 7
 55

PATTERN OF INTERACTION FOR WHOLE GROUP

11.25 PATTERN OF INTERACTION

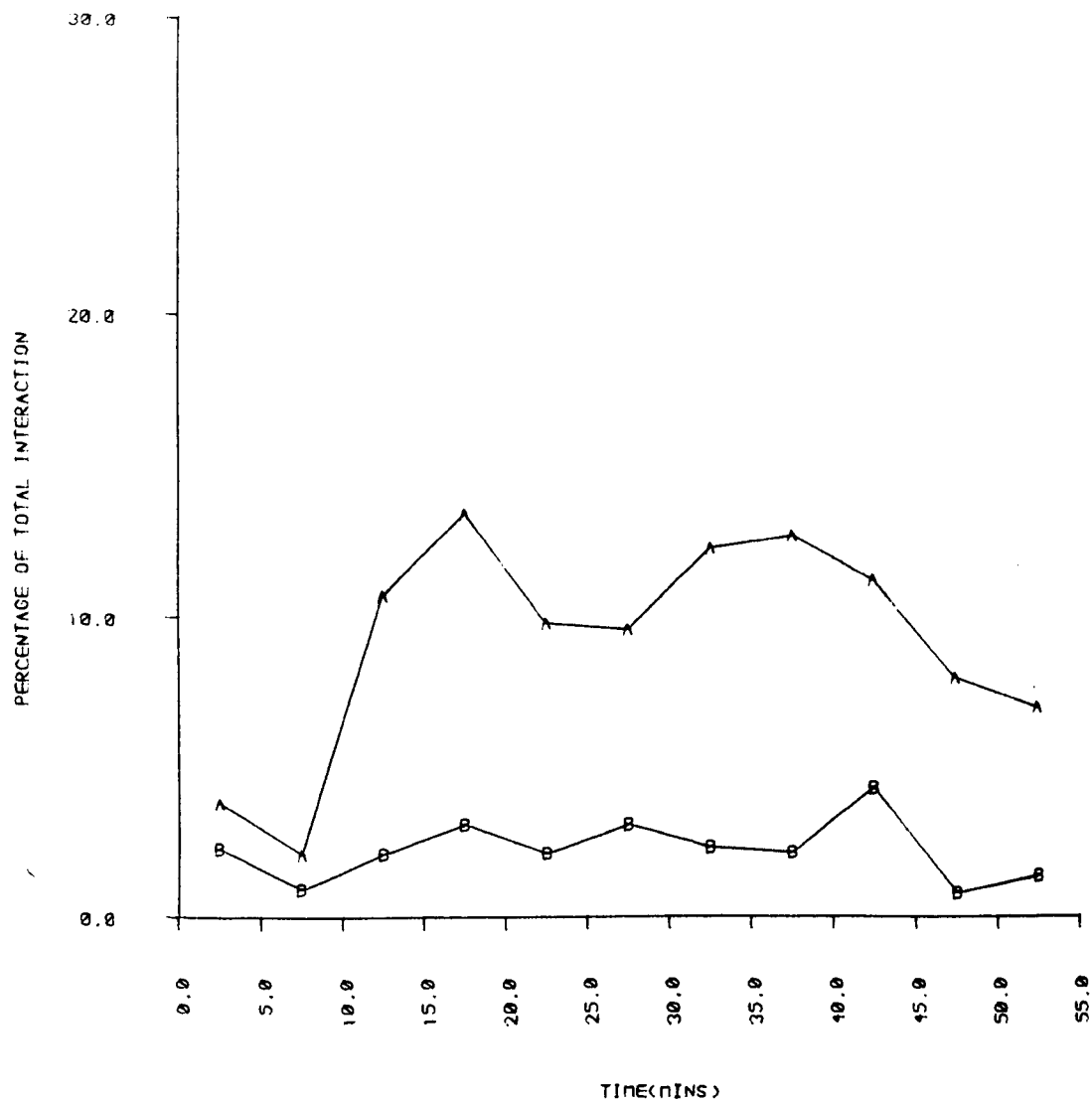


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

TCXO AT QUARTZ CRYSTAL
 31.1.94
 7
 55

PATTERN OF INTERACTION FOR FACILITATOR

11.26 PATTERN OF INTERACTION TCXO AT QUARTZ CRYSTAL



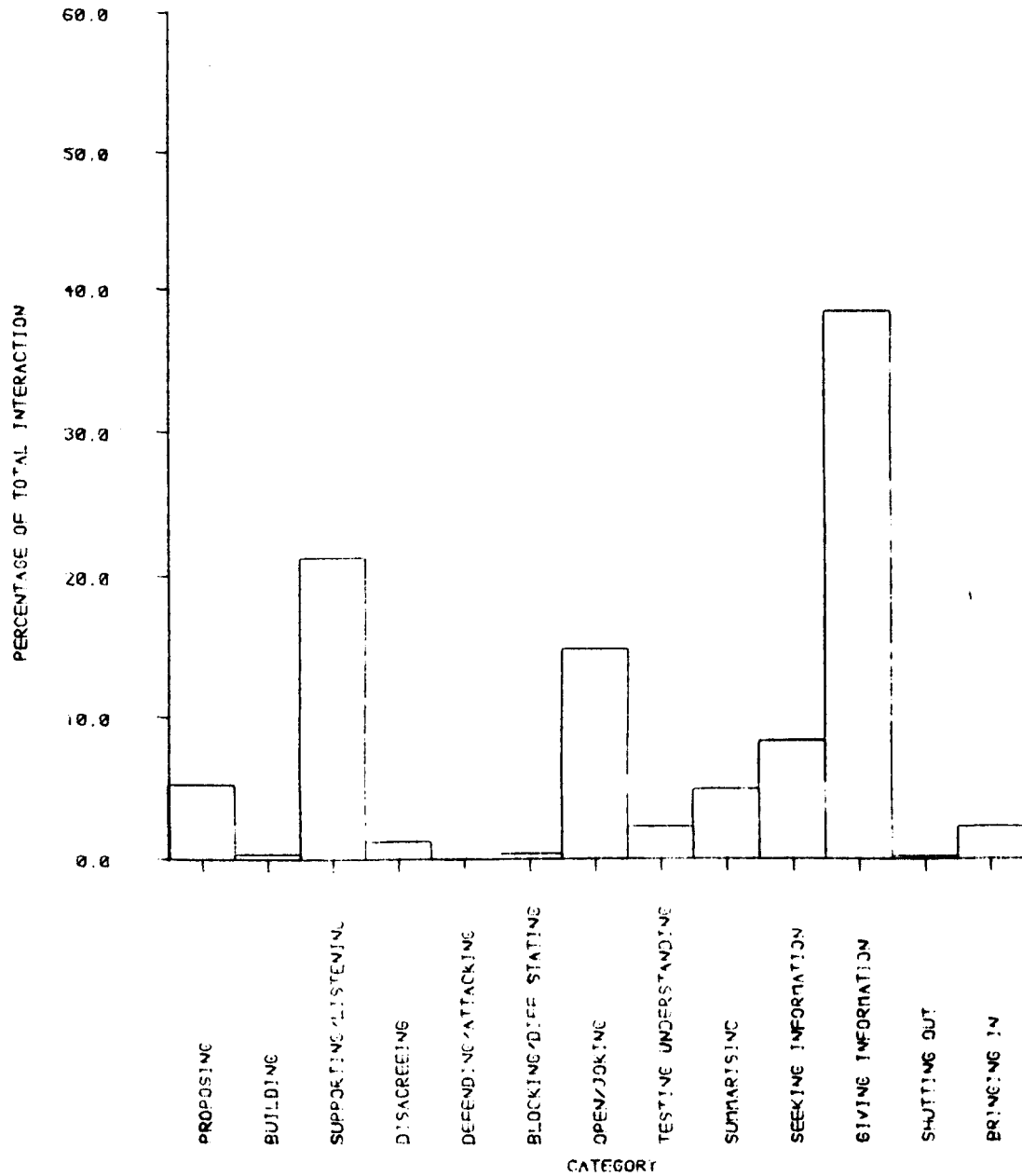
DATA

DATE 31.1.84
NO OF PARTICIPANTS 7
DURATION 55

LEGEND

A WHOLE GROUP
B FACILITATOR

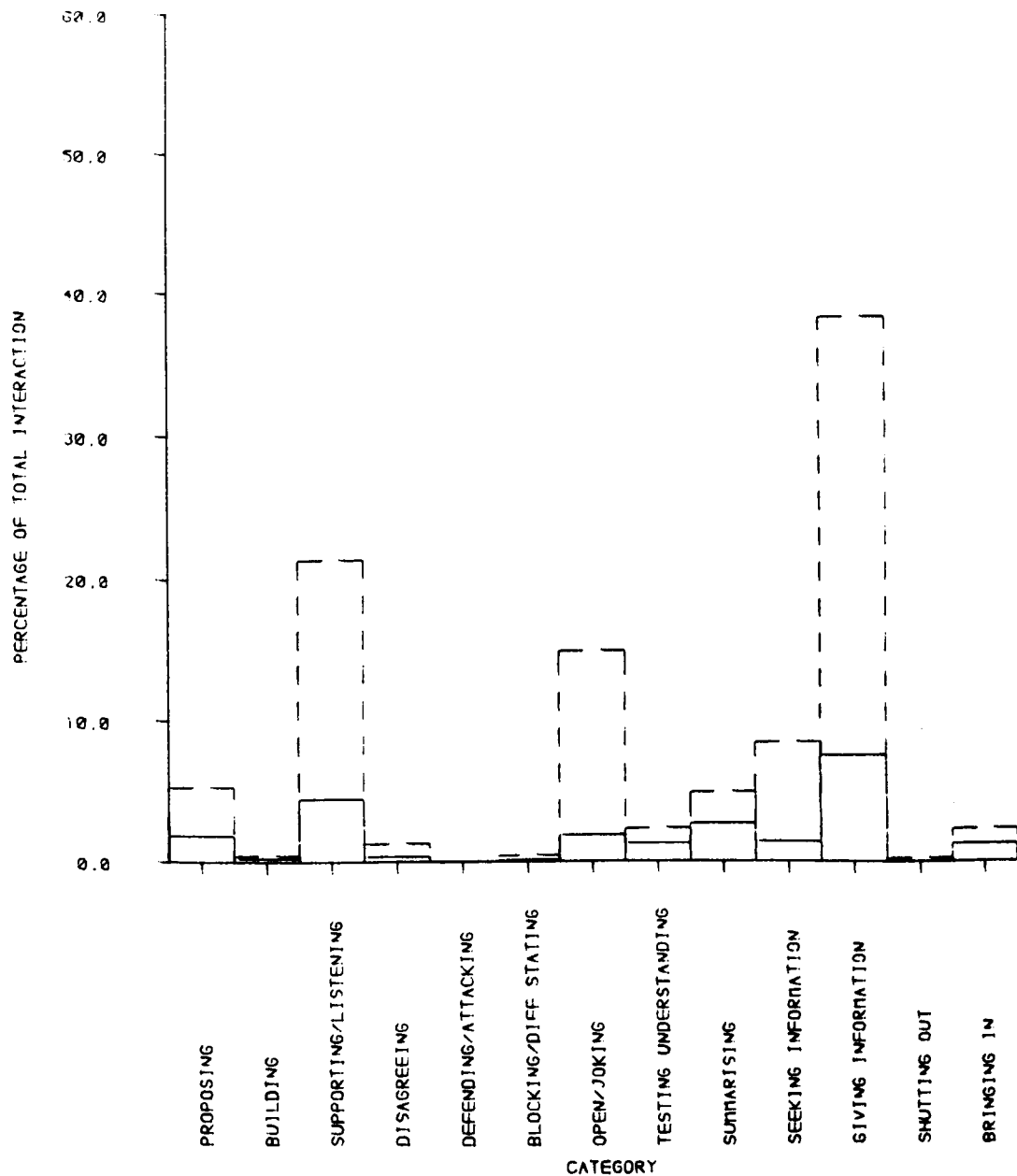
11.27 PATTERN OF INTERACTION



DATA
 QUALITY: CIRCLE MACHINE SHOP 1 AT ETD
 DATE 16.3.84
 NO OF PARTICIPANTS 8
 DURATION 55

PATTERN OF INTERACTION FOR WHOLE GROUP

11.28 PATTERN OF INTERACTION

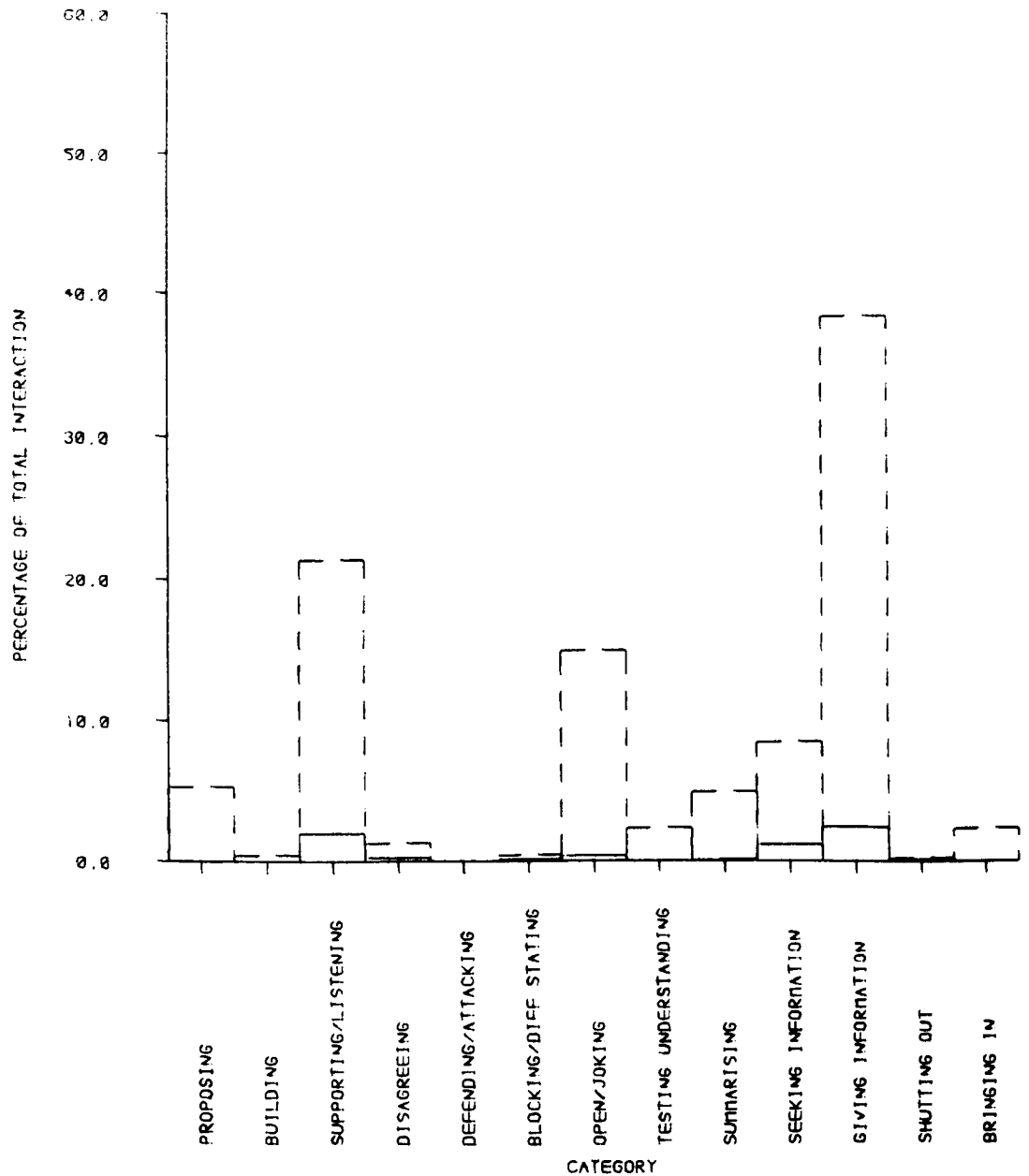


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

MACHINE SHOP 1 AT ETD
 16.3.94
 8
 55

PATTERN OF INTERACTION FOR LEADER

11.29 PATTERN OF INTERACTION

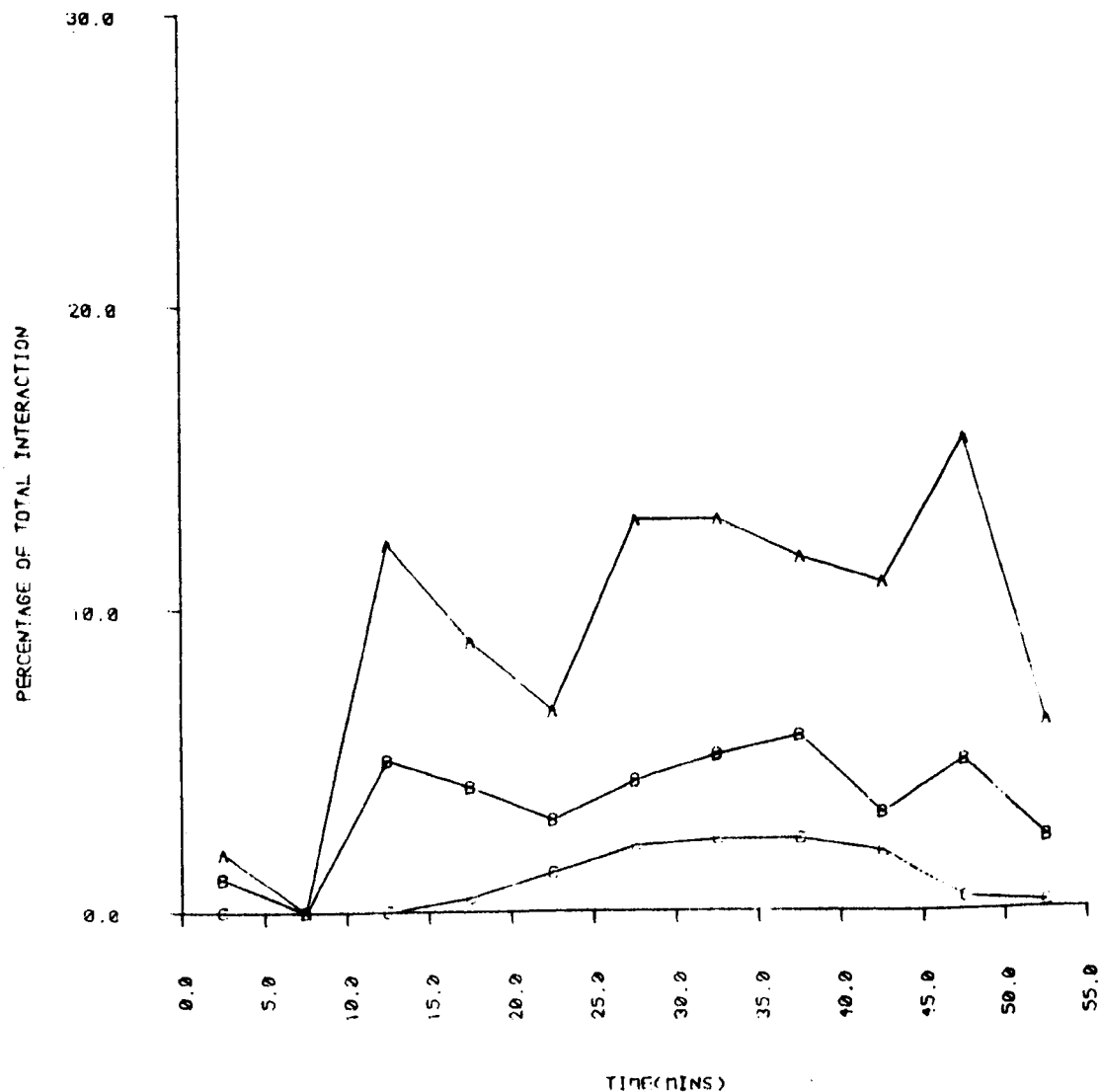


DATA
 QUALITY CIRCLE
 DATE
 NO OF PARTICIPANTS
 DURATION

MACHINE SHOP 1 AT ETD
 16.3.94
 8
 55

PATTERN OF INTERACTION FOR GUEST

11.30 PATTERN OF INTERACTION MACHINE SHOP 1 AT ETD



DATA

DATE 16.3.84
NO OF PARTICIPANTS 8
DURATION 55

LEGEND

A WHOLE GROUP
B LEADER
C GUEST

APPENDIX 12

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